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Thirty-day Field Tests of Industrial Boilers: Site 1 Coal-fired Spreader Stoker

KVB, Inc.
Irvine, CA

Prepared for

Industrial Environmental Research Lab.
Research Triangle Park, NC

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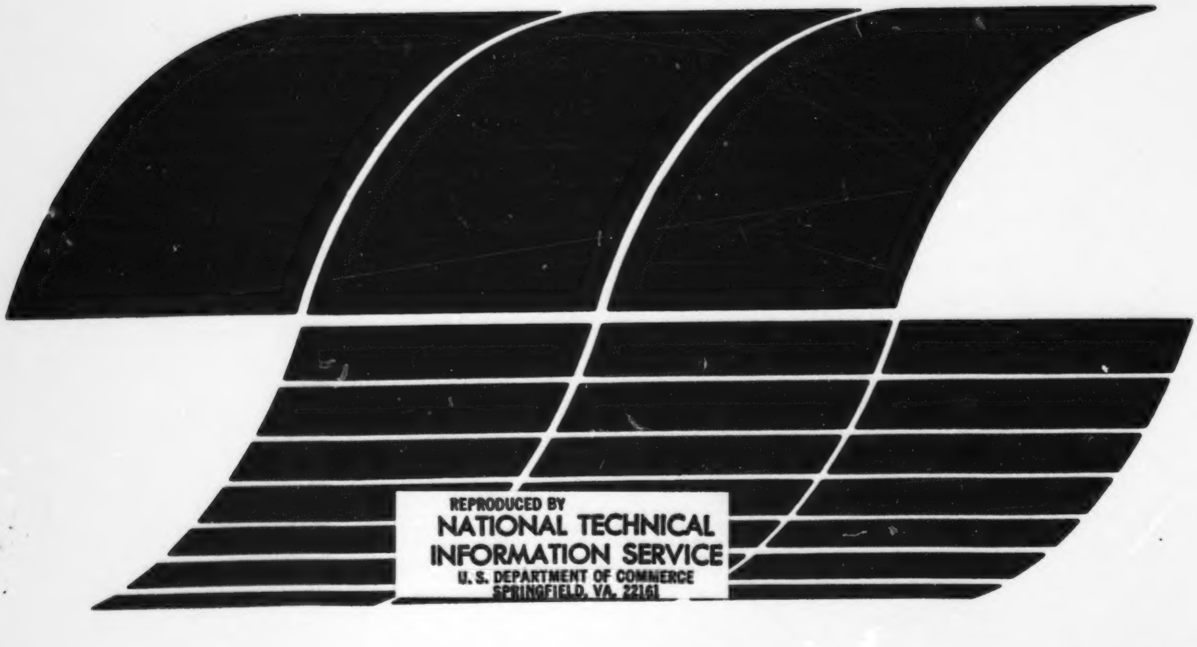
Interagency Energy/Environment R&D Program Report



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April 1980

Thirty-day Field Tests of Industrial Boilers: Site 1 — Coal-fired Spreader Stoker

by

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U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Research and Development
Washington, DC 20460

ABSTRACT

This is a final report on a test program to evaluate the long term effectiveness of combustion modifications on industrial boilers. During previous programs short term tests have been performed on industrial boilers to determine the effect of combustion modifications on air pollutant emissions such as NOx, SOx, CO, HC, and particulate. The objective of this program was to determine whether the combustion modification techniques which were effective for short duration tests are feasible for a longer period. This report presents results of a 30-day field test of a 29.3 MW output (100,000 lb steam/hr) coal fired spreader stoker. The NOx control technology employed on this unit was low excess air. The as found concentration of NOx was 244 ng/J (400 ppm at 3% O_2, dry) with the boiler load at 80% of design capacity. Firing in the low excess air modes resulted in a reduction in NOx of approximately 20% from the as found condition. Low excess air firing also resulted in an increase in efficiency of approximately 3%.

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SECTION 1.0

SUMMARY

1.1 OBJECTIVE AND SCOPE

The objective of this field test was to determine whether combustion modification techniques which demonstrated reductions on air pollutant emission during short term tests are feasible for longer periods. In addition, boiler performance and reliability were monitored. The combustion modifications have previously been shown to be effective on industrial boilers (Refs. 1, 2, 3).

The program scope provides for 30-day field tests of a total of seven (7) industrial boilers with design capacities ranging from 14.65 to 73.25 MW output (50,000 to 250,000 lb steam/hr). Fuels to be burned include natural gas, light oil, residual oil, and coal. This final report is for a 29.3 MW output (100,000 lb steam/hr) coal fired stoker using low excess air (LEA) as the emission control technology.

During the test period, continuous monitor certification tests were performed concurrent with low NOx testing. Emissions measured were particulate, NO, CO_2, CO, and O_2. Boiler efficiency was measured several times during the program to determine the effect of combustion modification on boiler efficiency.

This is a final report on the 30-day test, documenting the test equipment, a summary of the test data, and a discussion of the data in relation to the control technology employed for this type of boiler.

1.2 RESULTS

A coal stoker using low excess air (LEA)as the control technology was selected for this field test. A survey of previous tests on coal fired boilers was conducted to determine if a boiler was available which would provide low NO_x operation using the desired NO_x control technology. Included in the survey were boilers tested under previous EPA programs (Refs. 1, 2, and 3) as well as current programs. It was desirable to select a unit which had been tested previously in order to know its capability for low NO_x operation and to minimize set up time and eliminate the need for extensive modification testing.

The boiler selected for testing at Site 1 was selected on the basis that previous testing had been performed by KVB and the unit had shown a capability of operating under low NO_x conditions. Although the boiler selected for testing was built in 1953 it is representative of the majority of coal-fired industrial boilers sold today. During a previous EPA sponsored program (Reference 1) a boiler survey and analysis was performed to determine the population and distribution of coal-fired industrial sized boilers. This study showed that nationally, spreader stokers account for about 50% of the units sold during the nine year period 1965 to 1974 followed by 20% for other types of coal firing, 13% for overfed stokers, 9% for pulverized, and 7% for underfed stokers.

After selection of the test site, a continuous monitor was shipped to the site and installed. The next task was to perform the certification tests as outlined in Performance Specification 2 and 3, 40 CFR60, Appendix B. (See Appendix D.)

Following the monitor certification, the 30-day field test was conducted. The test was performed according to "Plan for Performing Source Evaluation Tests in Support of NSPS for Industrial Boilers." Emissions of NO, CO, CO_2, and O_2 were monitored continuously. Particulate measurements were made in triplicate at the start, mid-point, and conclusion of the test period. In addition triplicate particulate measurements were made in the "as found" condition. Measurements of polycyclic organic matter were made in both the modified and unmodified condition.

The results of the 30-day test are discussed in detail in Section 3.0. A summary of the gaseous and particulate emissions and test comments is presented in Table 1-1. The data presented in this table were recorded by a technician on a 2-hour basis each day and are in addition to the continuous strip chart recordings. Table 1-2 is a summary of the 24-hour averages of gaseous emissions and boiler load data. This table was compiled from the continuous strip chart recordings and plant recordings. An analysis of the field test data was prepared. A log-probability plot of 24 hour averages is presented in Figure 1-1. The mean value for the NO is 170 ng/J with a geometric dispersion of 1.08 at a boiler load of approximately 20.5 MW (70,000 lb/hr) steam output.

1.3 CONCLUSIONS

Based on the results of this 30-day field test, several important conclusions can be drawn.

1. Low excess air (LEA) is an effective NO_x control technology for the coal fired spreader stoker tested. The LEA condition was maintained for 30 days with an average NO emission level of 170 ng/J (278 ppm @ 3% O_2 dry) with a dispersion of 1.08 with the boiler load between 20.5 and 23.2 MW thermal output (70,000 to 79,000 lb. steam/hour). At the same load the baseline NO emissions are estimated to be 200 ng/J (360 ppm). The NO emissions level for 17.6 to 20.5 MW (60,000 to 70,000 lb. steam/hour) thermal output was 168 ng/J with a geometric dispersion of 1.06. The NO emission level of the boiler in the unmodified condition for this load range is 240 ng/J.

   Low excess air operation results in a 23% reduction in NO emission rate at the high load range and a 10% reduction at the lower boiler load. Emissions are measured as NO and reported as NO_2 equivalent.

2. Boiler operation in the LEA mode presented no reliability or functional problems. The LEA mode can be maintained for extended periods providing adequate instrumentation and display are provided. An indoctrination and training period for operators is recommended.

3. Operation of the boiler in the LEA mode resulted in 24% higher particulate emissions than for normal operation. Normal operation produced

233 ng/J (0.540 lb/10^6 Btu) of particulate emissions. Operation in the LEA mode resulted in average particulate emissions of 290 ng/J (0.673 lb/10^6 Btu). Additional testing would be required to optimize the boiler for both NOx and particulate emissions.

4. The continuous monitor system utilizing an extractive sample system provided accurate, reliable data for the entire 30-day test period. Calibration of instruments on a daily basis is necessary as is maintenance on the sample system. Probe plugging is a problem which requires periodic inspection and maintenance with coal fired units.

5. It is extremely unusual for an industrial boiler to operate at a constant load condition. Any effective control technology must be capable of operation over fairly large load changes.

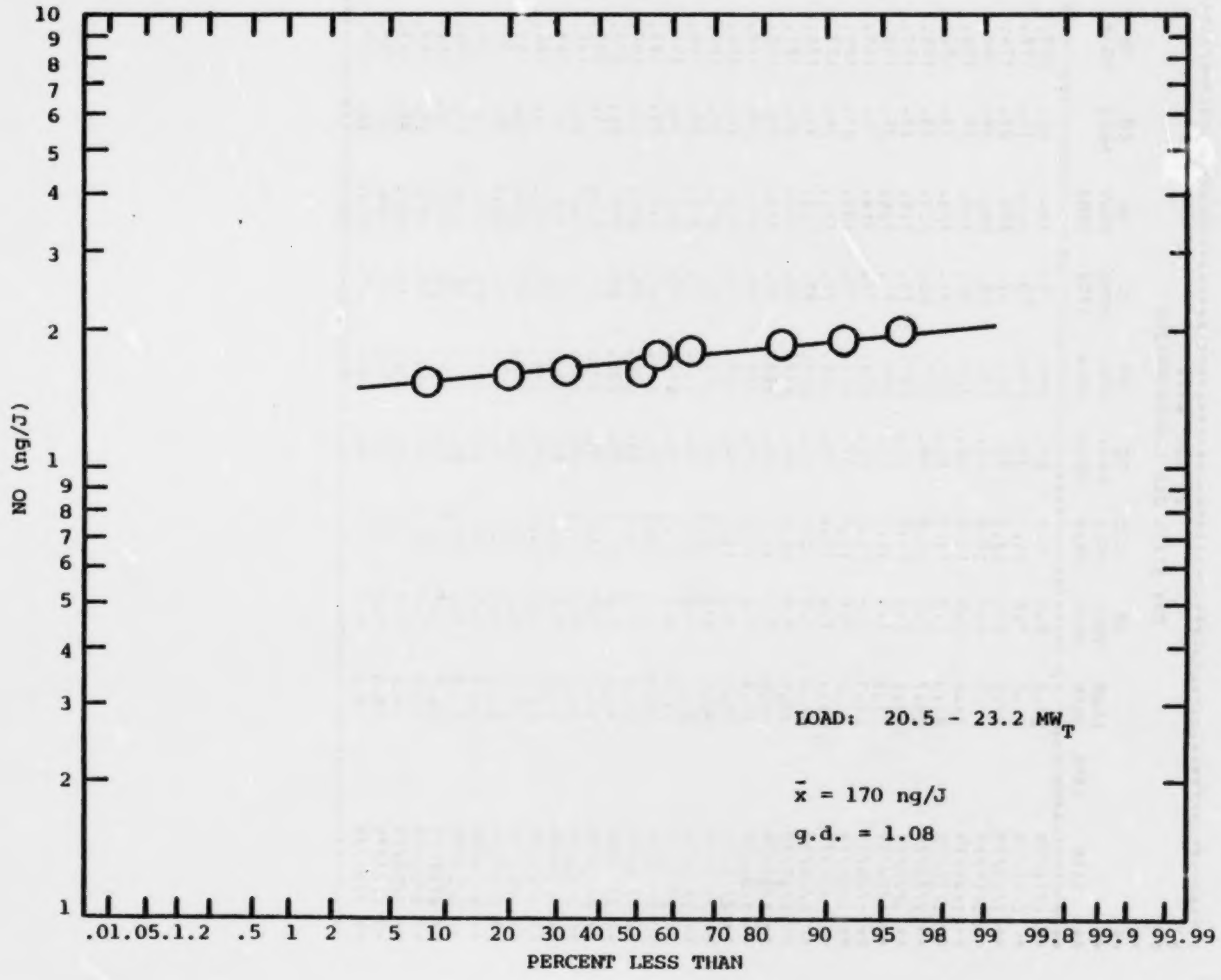


Figure 1-1. Coal-Fired Spreader Stoker, Site 1, NO Emissions

TABLE 1-2. SUMMARY OF 24-HOUR AVERAGE GASEOUS EMISSIONS

24 HOUR DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
1/16/79		23.5	9.3	9.8	59.	264.	90.	406.	32.	239.
1/17/79		21.7	7.8	11.7	39.	246.	53.	336.	19.	197.
1/18/79		20.5	7.1	12.3	52.	231.	67.	299.	24.	176.
1/19/79		20.5	6.9	12.0	64.	225.	82.	286.	29.	168.
1/20/79		20.6	7.5	11.5	62.	229.	82.	307.	29.	180.
1/21/79		21.0	7.8	11.3	66.	237.	90.	323.	32.	190.
1/22/79		20.7	7.5	11.5	48.	237.	63.	315.	23.	185.
1/23/79		20.1	7.9	11.0	51.	229.	70.	315.	25.	185.
1/24/79		21.1	7.8	11.1	52.	235.	70.	320.	25.	188.
1/25/79		21.3	7.4	11.8	51.	233.	68.	310.	24.	182.
1/26/79		21.2	7.4	11.9	57.	216.	75.	287.	27.	169.
1/27/79		20.1	7.6	11.6	55.	224.	74.	301.	26.	177.
1/28/79		20.4	7.9	11.6	62.	228.	85.	313.	30.	184.
1/29/79		20.5	7.6	11.6	59.	229.	79.	307.	28.	181.
1/30/79		21.0	7.1	12.1	64.	223.	83.	289.	30.	170.
1/31/79		20.6	7.4	11.4	49.	221.	64.	292.	23.	172.
2/ 1/79		21.1	6.5	11.9	60.	228.	74.	282.	26.	166.
2/ 2/79		20.4	6.8	11.8	64.	218.	80.	277.	29.	162.
2/ 3/79		21.1	6.9	11.7	76.	213.	97.	273.	35.	160.
2/ 4/79		21.6	6.5	12.3	76.	211.	94.	262.	34.	154.
2/ 5/79		22.2	6.6	12.3	85.	222.	107.	278.	38.	163.
2/ 6/79		21.2	6.8	12.0	74.	220.	93.	279.	33.	164.
2/ 7/79		20.8	7.2	11.7	45.	220.	58.	288.	21.	169.
2/12/79		20.4	7.9	11.0	35.	230.	48.	316.	17.	185.
2/13/79		20.7	7.5	11.4	42.	231.	56.	308.	20.	181.
2/14/79		19.8	7.2	11.7	40.	212.	52.	278.	19.	163.
2/15/79		18.0	7.1	11.9	34.	210.	44.	273.	16.	160.
2/16/79		19.1	6.9	12.3	35.	214.	45.	274.	16.	161.
2/17/79		21.6	6.3	12.5	46.	221.	57.	271.	20.	159.
2/18/79		20.2	6.5	12.0	48.	218.	60.	271.	22.	159.
2/19/79		21.2	6.0	12.2	51.	221.	62.	265.	22.	155.
2/20/79		20.7	6.8	11.9	52.	217.	66.	276.	24.	162.
2/21/79		17.8	7.9	11.1	39.	203.	54.	279.	19.	164.
2/22/79		18.0	7.8	11.2	46.	202.	62.	277.	22.	163.
2/23/79		14.5	9.6	9.8	45.	193.	72.	306.	26.	180.
2/24/79		16.6	8.5	10.8	46.	187.	67.	270.	24.	159.

SECTION 2.0

INSTRUMENTATION AND PROCEDURES

This section presents a description of the instrumentation used to measure the gaseous and particulate emissions, the test procedures, and techniques for certifying the continuous monitor and a description of the boiler tested.

2.1 EMISSIONS MEASUREMENT INSTRUMENTATION

The emissions measurements were made using a continuous monitor fabricated by KVB for this program. The analytical instrumentation and sample handling equipment are contained in a cabinet 1.2 m wide x 0.76 m deep x 183 m high (48"W x 30"D x 72"H). A photograph of the continuous monitor is shown in Figure 2-1. Gaseous emission measurements were made with the analytical instruments listed in Table 2-1.

Total particulate measurements were made using an EPA Method 5 sampling train manufactured by Western Precipitation Division of Joy Manufacturing Company. Samples for measurement of polycyclic organic matter (POM) were obtained using an XAD-2 module supplied by Battelle Columbus Laboratories. These modules were returned to Battelle for analysis following the test.

2.1.1 Gaseous Emissions

The continuous monitor is equipped with analytical instruments to measure concentrations of NO, CO, CO_2, and O_2. The sample gas is delivered to the analyzers at the proper condition and flow rate through the sampling

TABLE 2-1. ANALYTICAL INSTRUMENTATION

Emission Species	Manufacturer	Measurement Method	Model No.
Nitrogen Oxides	Thermo Electron	Chemiluminescent	10A
Oxygen	Beckman Instrument	Polarographic	742
Carbon Dioxide	Horiba Instrument	NDIR	PIR-2000
Carbon Monoxide	Horiba Instrument	NDIR	PIR-2000
Opacity	Dynatron	Transmissometer	1100

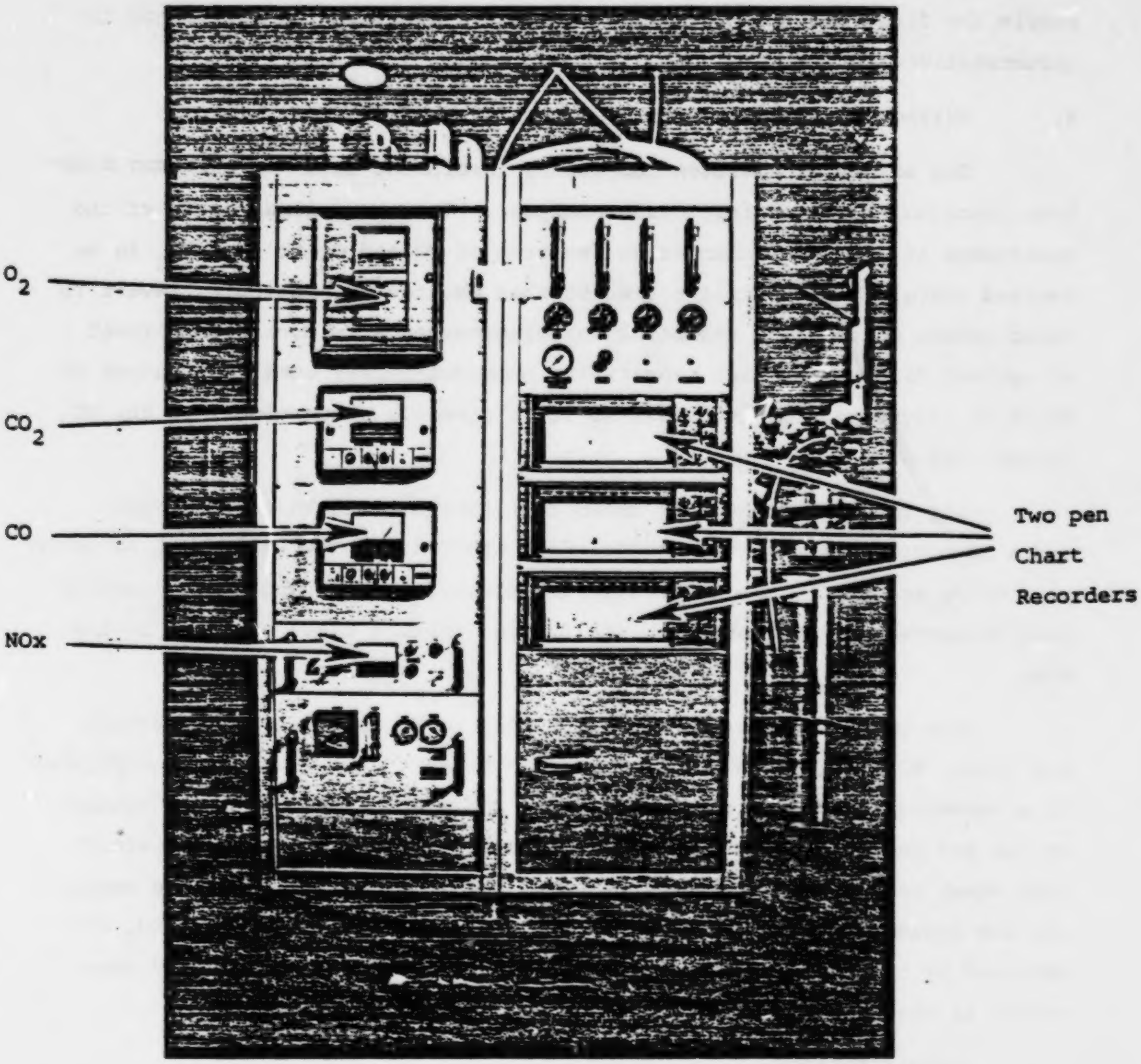

O_2
CO_2
CO
NOx
Two pen
Chart
Recorders

Figure 2-1. Photograph of KVB Continuous Monitor for measuring gaseous emissions.

and conditioning system shown schematically in Figure 2-2. A probe with a 0.7 micrometer sintered stainless steel filter was installed in the stack to sample the flue gas. The following paragraphs describe the analytical instrumentation.

A. Nitrogen Oxides--

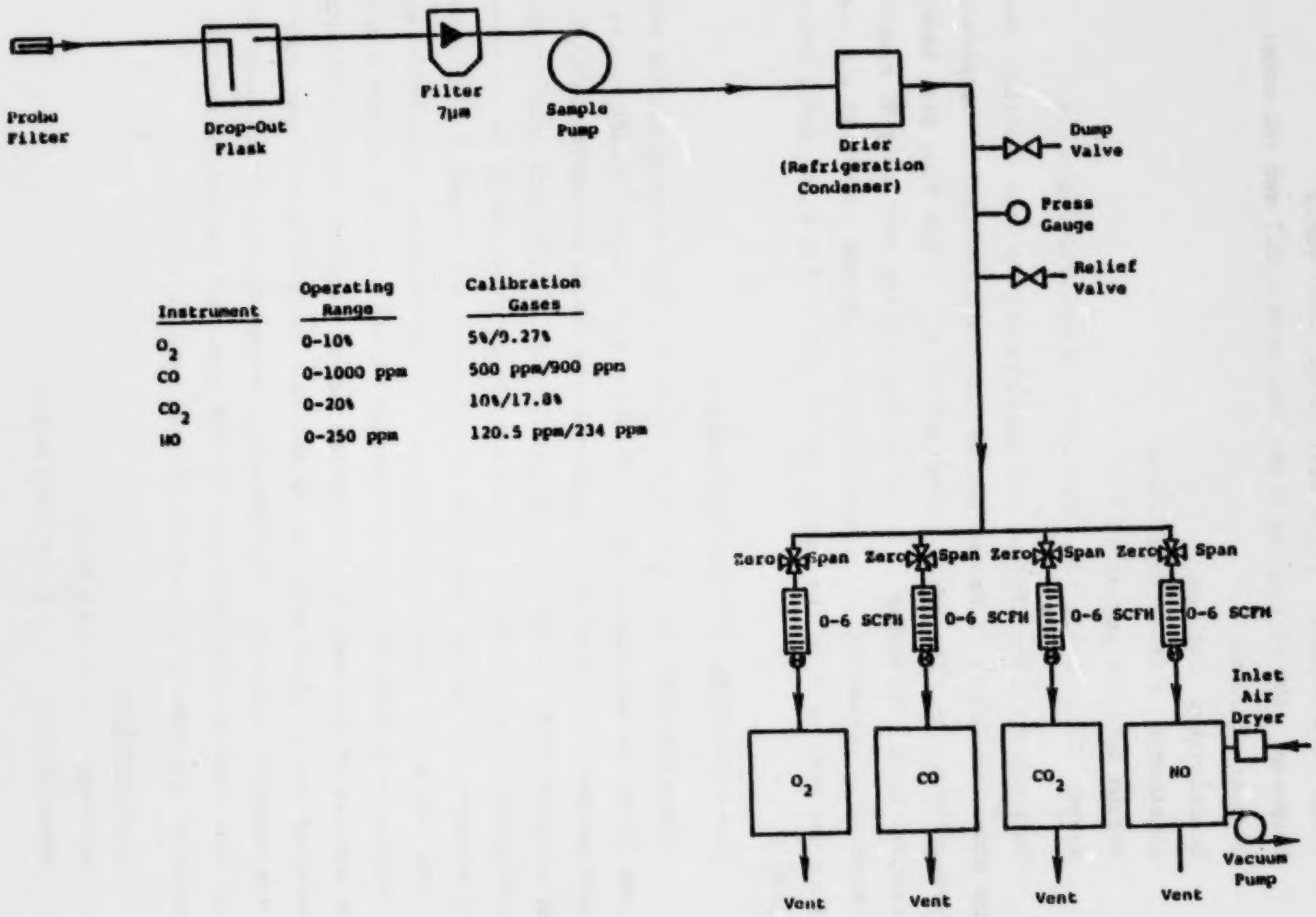
The oxides of nitrogen monitoring instrument used was a Thermo Electron chemiluminescent nitric oxide analyzer. The operational basis of the instrument is the chemiluminescent reaction of NO and O_3 to form NO_2 in an excited state. Light emission results when excited NO_2 molecules revert to their ground state. The resulting chemiluminescence is monitored through an optical filter by a high sensitivity photomultiplier tube, the output of which is electronically processed so it is linearly proportional to the NO concentration.

Air for the ozonator is drawn from ambient through an air dryer and a 10-micrometer filter element. Flow control for the instrument is accomplished by means of a small bellows pump mounted on the vent of the instrument downstream of a separator which insures that no water collects in the pump.

The basic analyzer is sensitive only to NO molecules. To measure NOx (i.e., NO + NO_2), the NO_2 is first converted to NO. This is accomplished by a converter which is included with the analyzer. The conversion occurs as the gas passes through a thermally insulated, resistance heated, stainless steel coil. With the application of heat, NO_2 molecules in the sample gas are reduced to NO molecules, and the analyzer then reads NOx. NO_2 is obtained by the difference in readings obtained with and without the converter in operation.

Specifications

Accuracy: 1% of full scale
Span drift: ± 1% of full scale in 24 hours
Zero drift: ± 1 ppm in 24 hours


Probe Filter
Drop-Out Flask
Filter 7μm
Sample Pump
Drier (Refrigeration Condenser)
Dump Valve
Press Gauge
Relief Valve
Zero
Span
Zero
Span
Zero
Span
Zero
Span
0-6 SCFH
0-6 SCFH
0-6 SCFH
0-6 SCFH
Inlet Air Dryer
O_2
CO
CO_2
NO
Vacuum Pump
Vent
Vent
Vent
Vent

Instrument	Operating Range	Calibration Gases
O_2	0-10%	5%/9.27%
CO	0-1000 ppm	500 ppm/900 ppm
CO_2	0-20%	10%/17.8%
NO	0-250 ppm	120.5 ppm/234 ppm

Figure 2-2. Schematic of continuous monitor sampling and conditioning system.

Power requirements: 115 ± 10V, 60 Hz, 1000 watts

Response: 90% of F.S. in 1 sec (NO_x mode); 0.7 sec (NO mode)

Output: 4-20 ma

Sensitivity: 0.5 ppm

Linearity: ± 1% of full scale

Vacuum detector operation

Range: 2.5, 10 25, 100, 250, 1000, 2500, 10,000 ppm F.S.

Only the NO concentration was measured during this program. Because of the added complexity of heated sample lines and controllers necessary for measuring NO_2 and the small percentage of NO_2 in the flue gas, based on previous tests (Reference 1, 2 and 3) EPA decided that only NO measurement was necessary. Therefore, an unheated sample line was installed and the moisture was removed from the sample gas by a drop out flask and a refrigerated condenser.

B. Carbon Monoxide and Carbon Dioxide--

Carbon Monoxide (CO) and carbon dioxide (CO_2) concentrations were measured by Horiba Instruments PIR-2000 short path length nondispersive infrared analyzers. These instruments measure the differential in infrared energy absorbed from energy beams passed through a reference cell (containing a gas selected to have minimal absorption of infrared energy in the wave length absorbed by the gas component of interest) and a sample cell through which the sample gas flows continuously. The differential absorption appears as a reading on a scale of zero to 100% and is then related to the concentration of the species of interest by calibration curves supplied with theinstrument. A linearizer was supplied with the CO analyzer to provide a linear output over the range of interest. The operating ranges for the CO analyzer are zero to 500, zero to 1000, and zero to 2000 ppm, and the ranges for the CO_2 analyzer are zero to 5, zero to 10, and zero to 20%.

Specifications

Accuracy: 1% of full scale

Repeatability: ± 0.5% of full scale

Zero drift: ± 1% of full scale in 24 hours

Span drift: ± 1% of full scale in 24 hours

Response time: selectable - 90% of full scale in 0.5, 1.2, 3, or 5 seconds

Power requirements: 115 VAC ± 10%, 60 Hz

Warm up time: 30 minutes

Outpu : 0-10 MV

C. Oxygen--

A Beckman Model 742 oxygen analyzer was used to continuously determine the oxygen content of the flue gas sample. The oxygen measuring element contains a silver anode and gold cathode that are protected from the sample by a thin membrane of Teflon. An aqueous KCL solution is retained in the sensor by the membrane and serves as an electrolytic agent. As Teflon is permeable to gases, oxygen will diffuse from the sample to the cathode in the following oxidation-reduction reaction:

Cathode reaction: $O_2 + 2H_2O + 4e \rightarrow 4OH$

Anode reaction: $4Ag + 4Cl \rightarrow 4AgCl + 4e$

With an applied potential between the cathode and anode, oxygen will be reduced at the cathode causing a current to flow. The magnitude of this current is proportional to the partial pressure of oxygen present in the sample. The instrument has operating ranges of zero to 1%, zero to 10%, and zero to 25% oxygen.

Specifications

Accuracy: ± 1% of full scale or ± 0.05% O_2 which ever is greater

Sensor stability: ± 1% of full scale per 24 hours

Response time: 90% in 20 seconds

Output: 0-10 MV

Power requirement: 120 ± 10 VAC, 60 Hz

2.1.2 Particulate Emissions

Particulate samples were taken from two ports on the side of the duct located 90° from the gaseous emission sample port. The sample ports are located downstream of the multiclone collector and induced draft fan. The samples were taken using a Joy Manufacturing Company portable effluent sampler. This system, which meets the EPA design specifications for Test Mehod 5, (Determination of Particulate Emissions from Stationary Sources, Federal Register, Volume 42, No. 160, page 41754, August 18, 1977) is used to perform both the initial velocity traverse and the particulate sample collection. Dry particulates are collected in a heated case that contains, first a cyclone to separate particles larger than 5 micrometers, and second, a 100 mm glass-fiber filter for retention of particles down to 0.3 micrometers. Condensible particulates are collected in a train of four Greenburg-Smith impingers in a chilled water bath.

2.1.3 Polycyclic Organic Matter (POM) Emissions

Particulate and gaseous samples for analysis of polycyclic organic matter were taken at the sample port used for Method 5 particulate tests. The sampling system is a modified Method 5 sampling train developed by Battelle Columbus Laboratories. A combination of conventional filtration with collection of organic vapors by means of a high surface area polymeric adsorbent (XAD-2) proved highly efficient for collection of all but the more volatile organic species. The modified sampling system consists of the standard EPA train with the adsorbent sampler (Figure 2-3) located between the filter and the impingers. With this system filterable particulate can be determined from the filter catch and the probe wash according to Method 5, whereas the organic materials present can be determined from the analysis of the filterable particulate and the adsorbent sampler catch. The impingers are only used to cool the stream and protect the dry-gas meter, and their contents are discarded.

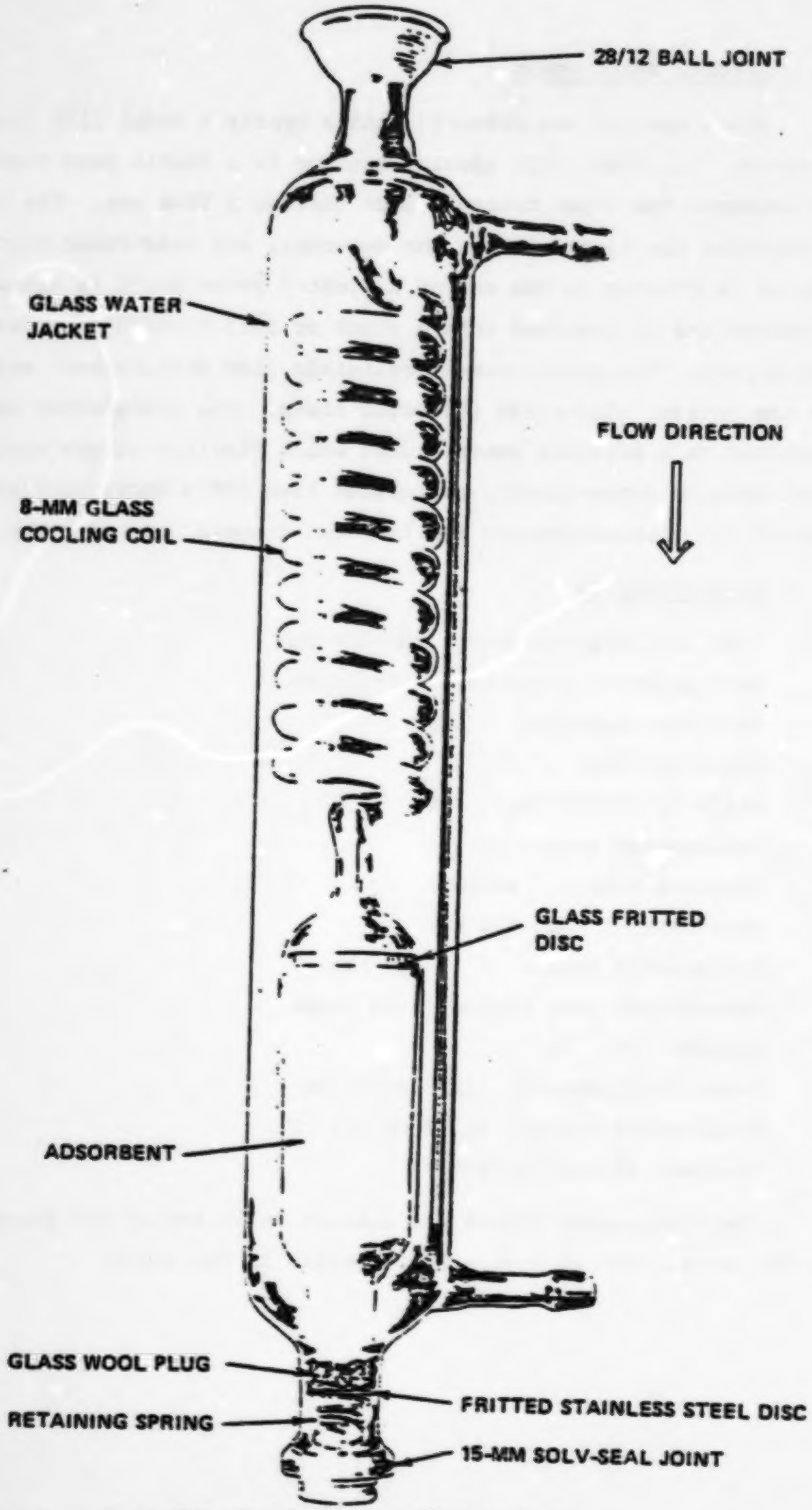

28/12 BALL JOINT
GLASS WATER JACKET
FLOW DIRECTION
8-MM GLASS COOLING COIL
GLASS FRITTED DISC
ADSORBENT
GLASS WOOL PLUG
FRITTED STAINLESS STEEL DISC
RETAINING SPRING
15-MM SOLV-SEAL JOINT

Figure 2-3. Mark III adsorbent sampling system.

2.1.4 Opacity Measurement

Stack opacity was measured with a Dynatron Model 1100 Opacity Monitoring System. The Model 1100 opacity monitor is a double pass transmissometer which measures the light transmittance through a flue gas. The transceiver unit contains the light source, the detector, and electronic circuitry. A reflector is mounted in the end of a slotted probe which is attached to the transceiver and is inserted into a stack or duct through a conventional stack sampling port. The probe causes negligible flow disturbance, and an air purge keeps the optical window and reflector clean. The transceiver output is transmitted to a portable control unit which displays either opacity or optical density automatically correlated from differences between the path length of the transmissometer and the mean diameter of the stack outlet.

Specifications

Peak spectral response: 500-600 nm
Mean spectral response: 500-600 nm
Relative response: < 10%
Angle of view: < 4°
Angle of projection: < 2°
Calibration error: < 2%
Response time: 1 second
Zero drift: < 1% (24 hrs)
Calibration drift: < 1% (24 hrs)
Operational test period: 168 hours
Output: 0-1 VDC
Power requirements: 115 VAC/60 Hz
Temperature range: 40 °F to 125 °F
Weight: 27 lbs (approx.)

The transceiver lenses are cleaned daily and an air purge is used to keep the lenses free of dirt while inserted in the stack.

2.2 BOILER DESCRIPTION AND CHARACTERISTICS

The boiler at Site 1 was manufactured by Babcock and Wilcox in 1952. The nameplate rating of this boiler is 29.3 MW (100,000 lb/hr steam). The actual maximum capacity of the unit was 24.9 to 26.4 MW (85,000 to 90,000 lb/steam/hr) due to fan limitations, sealed off boiler tubes and coal properties. The boiler, which is depicted in Figure 2-4, is fired with a Westinghouse Centrafire spreader stoker with a traveling grate and is a balance draft unit. Other specifications are as follows:

Specifications

Design pressure: 4.9 MPa (700 psig)
Steam temperature: 656 °K (720 °F)
Actual day-to-day operating pressure: 4.2 MPa (600 psig)
Boiler heating surface: 131.18 m^2 (1412 sq ft)
Conomizer heating surface: 518.12 m^2 (5577 sq ft)
Stoker grate size: 4.038 m x 4.94 m (13'3" x 16'2-1/2")
Stoker grate area: 19.96 m^2 (214.8 sq ft)
Base Coal: Fies Ky, Seam W. Kentucky #11

The test boiler is situated in a central heating plant in which there are five boilers. Four of these boilers are coal fired stokers and the fifth and largest boiler is gas and oil fired. The capacity of the steam plant is much larger than the normal demand and at the time of testing, two coal fired boilers rated at 29.3MW, were shut down even though the ambient temperature was sub-zero. To operate the test boiler at as high a load as possible, the load on the other boilers was reduced. Normal operation of the plant has the gas fired boiler supplying most of the demand and the coal fired stokers, if they are on line, operating at about 50% capacity. If a gas curtailment occurs, the load is picked up by the coal fired stokers.

2.2.1 Unit Operation

Coal enters the stoker from a hopper above the stoker which is fed by a conveyor system from the coal bunker. Coal is discharged by the feeder to a rotary spreader which throws the coal into the furnace and distributes it uniformly over the grate. Three Westinghouse Centrafire feeders are used with this boiler. The finer particles of fuel burn in suspension and the coarse particles fall to the surface of the fuel bed. The grate surface, with and area of 19.96 m^2 (214.8 sq ft) travels from rear to front with ash discharge

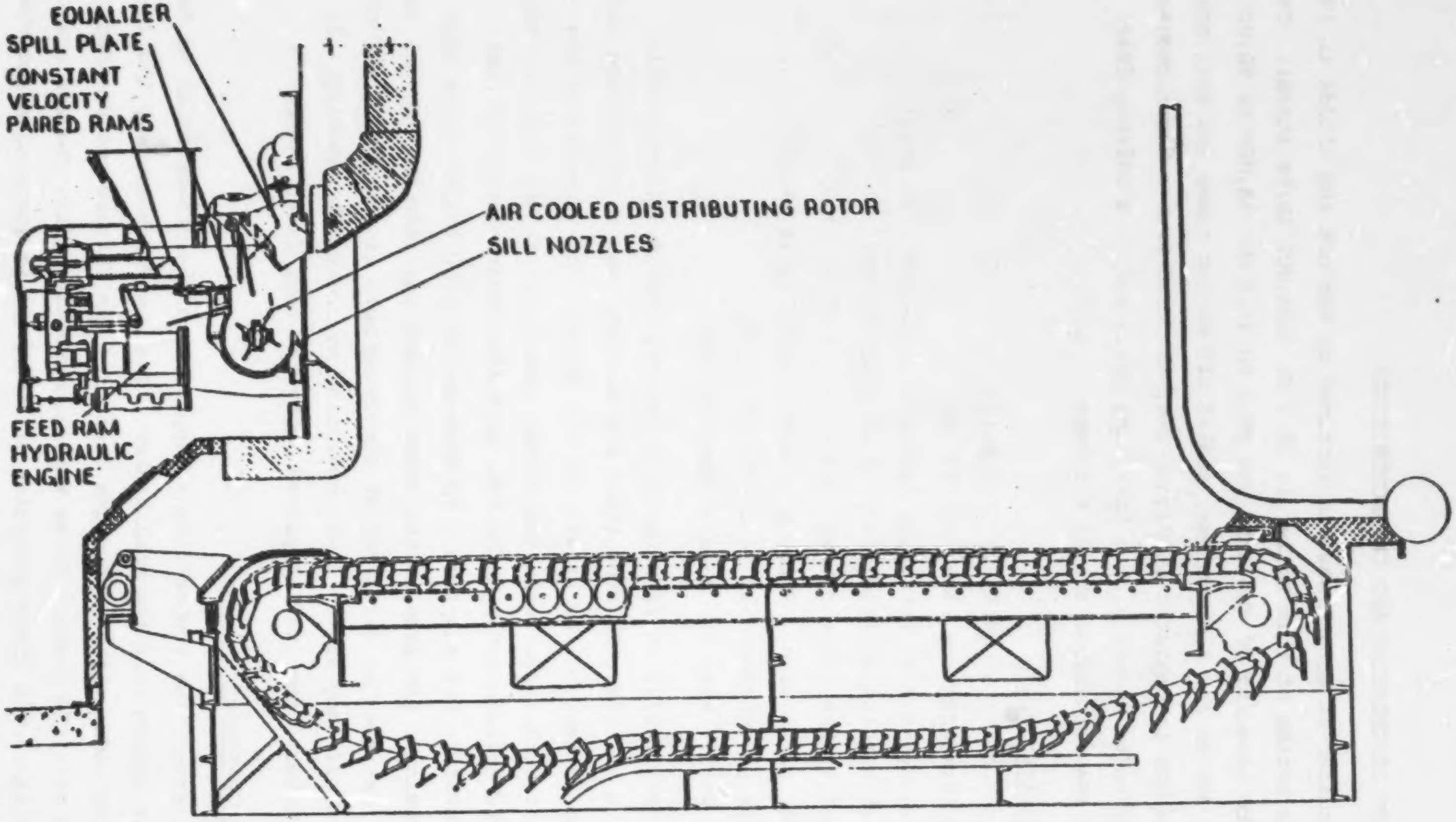

EQUALIZER
SPILL PLATE
CONSTANT VELOCITY PAIRED RAMS
AIR COOLED DISTRIBUTING ROTOR
SILL NOZZLES
FEED RAM HYDRAULIC ENGINE

Figure 2-4. Westinghouse Centrafire spreader stoker with traveling grate.

at the front. Control of coal feed rate distribution over the grate is by adjustment of rotor speed and spill plate adjustment. Overfire air is supplied by a separate blower and can be controlled with a damper.

Hot combustion gases travel upward in the furnace. At the top of the boiler, the gases begin a downward pass through an economizer section and then upward through a dust to a common breeching to the stack.

The unit has only a multiclone dust collector; fly ash drops out at the end of the economizer pass before the flue gases enter the ID fans and is removed by the pneumatic system.

2.2.2. Summary of Operational Factors

At a given load, normal operation of a stoker will vary significantly from operator to operator. Grate speed, spreader settings, ID and FD fan settings and excess air all vary according to the operator's preference. No oxygen monitors are currently in use at this facility so that excess air was estimated from the air flow pen. Operating conditions are checked periodically using an Orsat analyzer to determine excess air. Operation of the boiler requires less attention if it is operated at high excess air since this prevents smoking, avoids clinkers and assures complete burn out of the coal. During this field test, the continuous monitor system was installed adjacent to the control panel for the boiler. After the boiler operators became familiar with the instruments, they would set the excess air using the oxygen analyzer and the opacity monitor to operate at minimum excess air. Many positive statements were made by operating personnel regarding the ease of operation when a continuous oxygen analyzer is available to aid.

During previous testing at this site (See Appendix B), difficulties were encountered when low O_2 tests were conducted. At a low O_2 (4.5% to 5.5%) condition a patch of unburned coal formed at the rear of the furnace and increased in size with time. The load began to drop and attempts at burning out the patches had no success.

During this test series, careful attention was paid to the condition of the coal bed to detect any unburned coal patches. Adjustments were made to the feeder-distributor to eliminate any unburned coal patches. The feeder distributor and fuel feed drive are pictured in Figure 2-5.

During the previous tests at this test site, the effect of boiler load on emissions was evaluated. These data are presented in Appendix E. The maximum load achievable was 26.4MW thermal output. (90,000 lb steam/hr). The boiler load is limited by induced draft fan capacity. For this test period, the maximum load was 23.4MW (80,000 lb steam/hr) for a short period with the bulk of the testing at 20.5MW (70,000 lb steam/hr).

2.2.3 Daily Test Activity

This section describes the daily test activity at Site 1 following the monitor certification tests. The schedule of monitor certification test events is presented in Section 3.1. A schedule of daily events is presented in Table 2-2.

The data from the gaseous analyzers (NO, CO, CO_2, and O_2) were continuously recorded on strip chart recorders. Gaseous data were read from these strip charts five times daily by a technician and recorded on the form shown in Figure B-2, Appendix B. Boiler control room data (steam flow, pressure, etc.) were recorded three times daily by the KVB technician. Plant operating personnel recorded the data on an hourly basis. The gaseous emissions data were recorded only during an eight hour shift, but the strip chart recorders recorded the data 24 hours per day 7 days per week. No control room data were recorded during the week-ends, however, the technician did calibrate the instruments during the week-end.

Daily tasks consisted of 1) calibration and recording data, 2) consultation with operators to assure operation in the low NOx mode, 3) periodic maintenance of instruments and sample system, 4) visual inspection and trouble shooting of sampling system and instrumentation console, and 5) procuring supplies and equipment for the particulate and Method 7 tests.

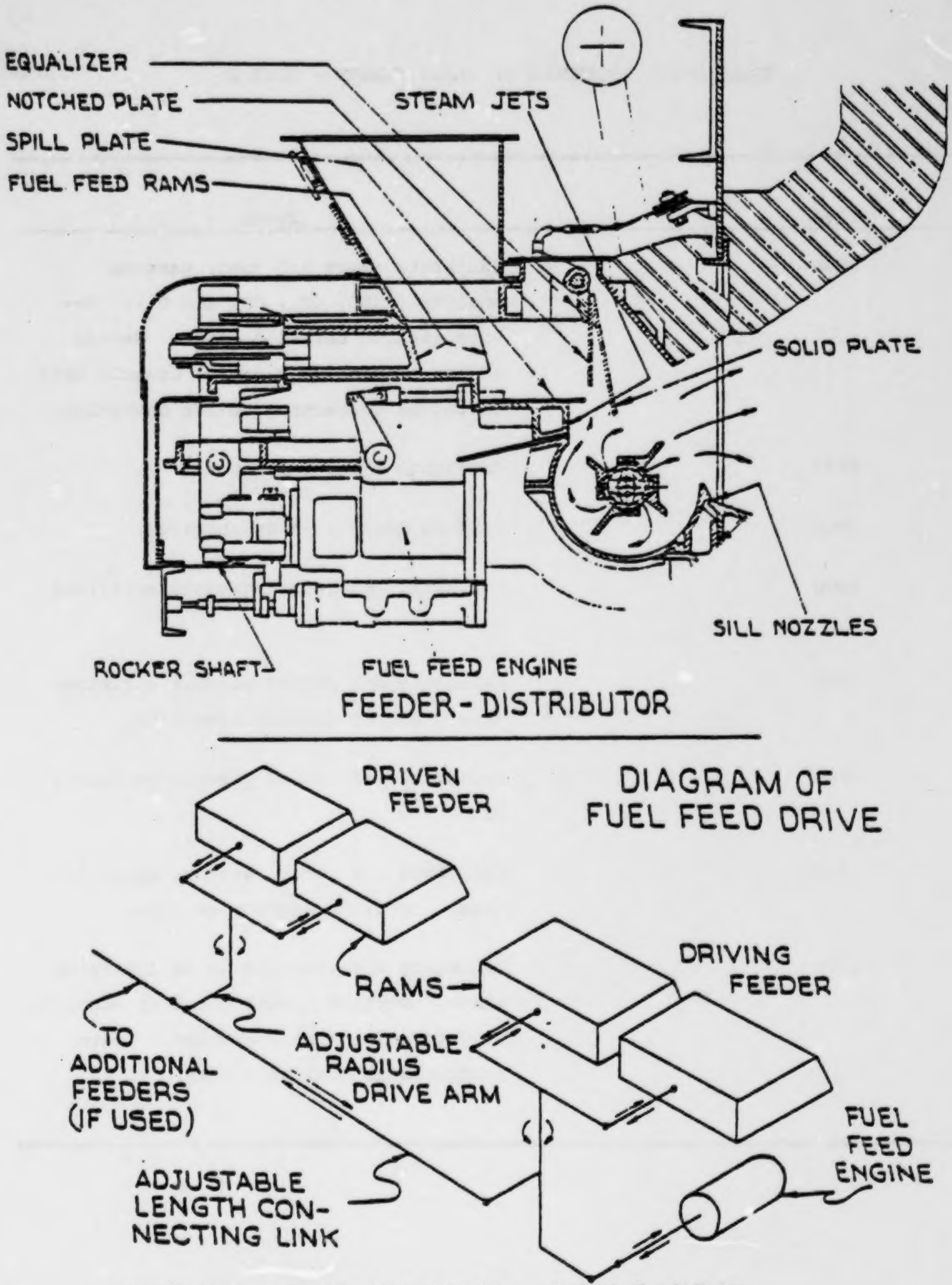

EQUALIZER
NOTCHED PLATE
SPILL PLATE
FUEL FEED RAMS
STEAM JETS
SOLID PLATE
SILL NOZZLES
ROCKER SHAFT
FUEL FEED ENGINE
FEEDER-DISTRIBUTOR
DRIVEN FEEDER
DIAGRAM OF FUEL FEED DRIVE
RAMS
DRIVING FEEDER
TO ADDITIONAL FEEDERS (IF USED)
ADJUSTABLE RADIUS DRIVE ARM
ADJUSTABLE LENGTH CONNECTING LINK
FUEL FEED ENGINE

Figure 2-5. Feeder distribution and fuel feed drive.

TABLE 2-2. SCHEDULE OF DAILY EVENTS - SITE 1

Time	Event
0800	Calibrate (zero and span) gaseous analyzers (NO, CO_2, CO, and O_2). Record gaseous emissions data. Record boiler control room data. Consult with operators concerning boiler operation.
0845	Calibrate opacity monitor.
0900	Perform daily systems checkout.
1000	Calibrate and record gaseous emissions data.
1200	Calibrate and record gaseous emissions data. Record control room data.
1400	Calibrate and record gaseous emissions data.
1600	Calibrate and record gaseous emissions data. Record control room data.
1700	Calibrate analyzers prior to departing plant. Perform visual check of sampling systems and boiler operation. Leave instructions with operators.

SECTION 3.0

TEST RESULTS

This section summarizes the emission and efficiency data collected on the coal fired spreader stoker boiler. The boiler was tested in the as-found condition initially and for 37 days in the low NOx condition. The tests were conducted with Kentucky coal as the fuel. The results presented herein summarize the gaseous and particulate emissions data, efficiency, and conclusions for the boiler operating under low NOx conditions for extended duration.

3.1 CONTINUOUS MONITOR CERTIFICATION TESTS

The continuous monitor described in the previous section was used to measure the boiler gaseous emissions. Following shipment to the test site, the monitoring system was installed and certification tests performed in accordance with Performance Specification 2 (PS2) and 3 (PS3), 40 CFR 60. Appendix B (See Appendix D) establishes minimum performance specifications that the NO monitoring system must meet in terms of eight parameters: accuracy, calibration error, two and 24 hour zero drifts, two and 24 hour calibration drifts, response time, and operational period.

The continuous monitor system was installed and instruments were initially calibrated on January 9, 1979. The following day the monitor performance certification began. A daily event schedule for the certification tests is presented in Table 3-1.

The performance of the continuous monitor is summarized in Table 3-2. Also shown in the table are the monitor specifications extracted from PS2 and PS3. Included in this table is the performance of the CO

TABLE 3-1. SCHEDULE OF CERTIFICATION TEST EVENTS

Date	Time	Event
1/11/79	1500	Calibration error determination
1/12/79	1000	Initial 24 hour zero and span reading. Initial 2 hour zero and span reading.
1/12/79	1200	1st 2 hour zero and span drift point
1/12/79	1400	2nd 2 hour zero and span drift point
1/12/79	1600	3rd 2 hour zero and span drift point
1/12/79	1800	4th 2 hour zero and span drift point
1/12/79	2000	5th 2 hour zero and span drift point
1/12/79	2200	6th 2 hour zero and span drift point
1/12/79	2400	7th 2 hour zero and span drift point
1/13/79	1000	1st 24 hour zero and calibration drift point. Initial 2 hour zero and calibration reading.
1/13/79	1200	8th 2 hour zero and span drift point
1/13/79	1400	9th 2 hour zero and span drift point
1/13/79	1600	10th 2 hour zero and span drift point
1/13/79	1800	11th 2 hour zero and span drift point
1/13/79	2000	12th 2 hour zero and span drift point
1/13/79	2200	13th 2 hour zero and span drift point
1/13/79	2400	14th 2 hour zero and span drift point
1/14/79	0200	15th 2 hour zero and span drift point
1/14/79	1000	2nd 24 hour zero and calibration drift point.
1/15/79	1000	3rd 24 hour zero and calibration drift point.
1/15/79	1100	Instrument response time tests
1/16/79	1000	4th 24 hour zero and calibration drift point.
1/16/79	1020	1st set of relative accuracy samples taken
1/16/79	1120	2nd set of relative accuracy samples taken
1/16/79	1220	3rd set of relative accuracy samples taken
1/16/79	1330	4th set of relative accuracy samples taken
1/16/79	1430	5th set of relative accuracy samples taken
1/16/79	1530	6th set of relative accuracy samples taken
1/16/79	1630	7th set of relative accuracy samples taken
1/16/79	1730	8th set of relative accuracy samples taken
1/16/79	1830	9th set of relative accuracy samples taken
1/17/79	1000	5th 24 hour zero and calibration drift point.
1/18/79	1000	6th 24 hour zero and calibration drift point
1/19/79	1000	7th and final 24 hour zero and calibration drift point

TABLE 3-2. INSTRUMENT SPECIFICATIONS AND PERFORMANCE

Parameter		Specifications	Performance
A. Thermo Electron Series 10 NOx Analyzer			
1. Accuracy		< 20% of mean ref. value	9.05%
2. Calibration error	mid	≤ 5% cal gas value	0.9%
	high	≤ 5% of cal gas value	0.6%
3. Zero drift (2 hour)		2% of span	1.20%
4. Zero drift (24 hour)		2% of span	1.13%
5. Calibration drift (2 hour)		2% of span	1.74%
6. Calibration drift (24 hour)		2.5% of span	1.98%
7. Response time		15 minute maximum	86 sec
8. Operational period		168 hour minimum	720 hr
B. Horiba Instruments PIR 2000 CO_2 Analyzer			
1. Zero drift (2 hour)		≤ 0.4 pct CO_2	0.2%
2. Zero drift (24 hour)		≤ 0.5 pct CO_2	0%
3. Calibration drift (2 hour)		≤ 0.4 pct CO_2	0.1%
4. Calibration drift (24 hour)		≤ 0.5 pct CO_2	0.09%
5. Response time		10 minutes	98 sec
6. Operational period		168 hour minimum	720 hr
C. Beckman Instruments Model 742 O_2 Analyzer			
1. Zero drift (2 hour)		≤ 0.4 pct O_2	DNA*
2. Zero drift (24 hour)		≤ 0.5 pct O_2	DNA*
3. Calibration drift (2 hour)		≤ 0.4 pct O_2	0.08%
4. Calibration drift (24 hour)		≤ 0.5 pct O_2	0.21%
5. Response time		10 minutes	72 sec
6. Operational period		168 hour minimum	720 hr
D. Horiba Instruments PIR 2000 CO Analyzer			
1. Calibration error	mid	≤ 5% of cal gas value	2.0%
	high	≤ 5% of cal gas value	0%
2. Zero drift (2 hour)		2% of span	0.44%
3. Zero drift (24 hour)		2% of span	1.10%
4. Calibration drift (2 hour)		2% of span	0.28%
5. Calibration drift (24 hour)		2.5% of span	1.44%
6. Response time		15 minute maximum	71 sec
7. Operational period		168 hour minimum	720 hr

* Instrument has no zero adjustment.

analyzer which is not covered by the performance specification. The CO analyzer is used to monitor the combustion conditions in the boiler since it is a very sensitive indicator of combustion performance. Tables C-1 through C-18, Appendix C, show the performance of each of the analyzers for the certification tests.

The data presented in Table 3-2 show analyzers in the continuous monitor bettered the performance specification values for each parameter for each instrument.

Certified calibration gases were obtained from Scott Environmental Technology Inc. The calibration gases included 50% and 90% span gases for the NO, CO_2, CO, and O_2 analyzers, and a zero gas. In addition to the certified analysis supplied by the vendor, sample flasks were taken for each calibration gas and sent to an independent laboratory for analysis.

Relative accuracy tests for the NO analyzer were performed as outlined in PS2 using EPA Reference Method 7 (phenoldisulfonic acid [PDS] colorimetric) as the standard. Nine sets of three PDS flasks were collected at one hour intervals at the beginning and end of the 30-day test period. At the fifteenth day, an abbreviated series of six flasks were taken. All sample flasks were returned to an independent laboratory for analysis. The results of the relative accuracy determination are shown in Tables C-17 and C-18 for the start and end of the 30-day tests. Both tests showed that the NO instrument greatly exceeded the accuracy requirements of PS2. The relative accuracy of the Thermo Electron NO analyzer was about 8% based on the first test series and about 10.5% based on the final test series. The relative accuracy requirement published in PS2 is $\leq$ 20% of mean reference value.

3.2 COAL FIRED STOKER BOILER TESTS

The continuous monitor system was installed by KVB personnel on January 7, 1979 in the control room at Site 1, a coal fired spreader stoker boiler. A single unheated 9.5mm (3/8") nylon sample line was strung from the duct downstream of the induced draft fan to the continuous monitor. A single stainless steel probe with a sintered stainless steel filter was installed in the center sampling port of the duct. Particulate samples were taken from two ports on the side of the duct approximately 0.3048 m (one foot) upstream of the gaseous sample probe.

The boiler was initially tested in the baseline or "as found" condition on January 16. The boiler load for these tests was approximately 23.4 MW output (80,000 lb/hr steam flow). Gaseous emissions data were measured hourly for nine hours at this boiler load condition. Triplicate PDS flask samples were collected at hourly intervals for the monitor relative accuracy determination. The average NO emission level was 244 ng/J (400 ppm at 3% O_2, dry) at 9.5% O_2 for the nine hour test. Coal bottom ash and fly ash samples were collected during the test. The coal being burned in the boiler was Fies Kentucky, Seam W. Kentucky #11.

The following day the boiler was adjusted to the low NOx operating condition. The NOx control technology used at this facility was low excess air. The excess air in this stoker is limited by smoke (opacity alarm limits were set at 20%), ash clinkering, and burnout.

Clinkers are a fused mass of slag globules. The formation of clinkers involve ash fusion, flow, and solidification. The viscosity of coal ash slag is important in clinker formation. If the slag globules have low viscosity at the temperature to which they are exposed, they will flow downward toward the grate where they encounter entering air and are cooled. If this causes them to stop flowing, they will solidify in fragments and will not coalesce to form a large clinker.

When coal burns on a grate, trouble with clinkers can be avoided by burning a thin fuel bed. When there are no clinkers, the flow of air through the fuel bed is uniform over the entire grate, and the desired rate of combustion is maintained. Once clinkers have started, they form at an increasing rate because the restriction to air flow by the clinker slows the combustion and causes the fuel to accumulate into a thicker fuel bed. Restricted air flow and thick fuel beds cause reducing conditions which favor clinker formation. This causes unburned fuel to drop into the ash pit.

Excess oxygen was lowered to 7.3% which operating personnel felt was the lowest practical limit based on the above criteria. The boiler load was reduced to 20.5 MW output (70,000 lb/hr steam flow) due to lowered demand for the plant. Load was then maintained at approximately this level for the next 28 days after which the load was lowered to 17.6 MW output (60,000 lb/hr steam) for six days. The final three days of testing were conducted at a load of 14.6 to 16.4 MW output (50,000 to 56,000 lb/hr steam.

The boiler load was increased to 22.6 MW (77,000 lb/hr steam) on January 26 to enable KVB to obtain low excess air measurements at higher loads for comparison with the baseline condition. The load was then again reduced to 20.5 MW output (70,000 lb/hr steam) at low excess air.

Triplicate Method 5 particulate tests were conducted after the boiler operating conditions were stabilized in the low NOx condition. Another triplicate set of particulate measurements were made at the mid point and an abbreviated (six) set of PDS flasks were taken to provide a check on relative accuracy. Triplicate Method 5 measurements were again made at the end of the test period with the boiler still in the low NOx condition. One of these three tests included collecting a sample for POM analysis as described in Section 2.1.3. Particulate tests including POM were then conducted in the baseline condition.

Coal, bottom ash, and fly ash samples were collected during each particulate test. A summary of all emissions data is presented in Table 3-3 for each day of testing. In general, gaseous emissions data were taken five times daily beginning at 0800. Boiler operating data were recorded three times daily. These data consisted of a complete set of boiler operating conditions and control settings. A control room data sheet is shown in Appendix B.

TABLE 3-3. SUMMARY OF OBSERVATIONS OF GASEOUS AND PARTICULATE EMISSIONS AT SITE 1, COAL FIRED SPREADER STOKER BOILER

Date	Nominal Steam Load		O_2	CO_2	NO*		CO		Particulate		Stack Temp.		Eff.	
1979	MW	K lb/hr	%	%	ng/J	ppm	ng/J	ppm	ng/J	lb/MBtu	K	°F	%	Comments
1/16	23.4	80	9.5	9.4	255	400	36.8	99	—	—	—	—	—	As found condition-high load, high O_2
1/17	20.8	71	7.3	12.4	189	296	19.3	52	399.6	0.931	494	430	78.6	Low NOx condition, Method 5 Test
1/18	20.5	70	7.2	12.3	198	311	23.4	63						LEA-Low NOx
1/19	20.8	71	7.0	11.9	174	284	22.7	61	360.1	0.839	489	420	79.3	LEA-Method 5 Test
1/19	20.5	70	7.1	11.6	182	297	26.4	71	361.4	0.842	489	420	79.4	LEA-Method 5 Test
1/20	20.5	70	7.1	11.4	190	311	25.3	68						LEA-Data from strip chart record
1/21	21.0	72	7.3	11.3	185	303	24.9	67						LEA-Data from strip chart record
1/22	20.5	70	7.6	11.2	194	317	22.7	61						LEA
1/23	21.1	72	7.3	11.3	193	316	23.4	63						LEA
1/24	20.8	71	7.3	11.6	194	318	22.3	60						LEA
1/25	21.1	72	7.4	11.9	198	324	21.2	57						LEA
1/26	22.6	77	6.8	12.4	163	268	38.3	103						LEA-High Load
1/26	20.8	71	7.5	11.7	169	277	28.6	77						LEA
1/27	20.1	69	7.3	11.6	185	303	30.5	82						LEA-Data from strip chart record
1/28	20.4	70	7.6	11.9	180	294	34.6	93						LEA-Data from strip chart record
1/29	20.8	71	7.4	11.5	184	302	25.3	68						LEA
1/30	20.8	71	7.1	12.4	158	285	20.6	61	221.5	0.516	489	420	81.6	LEA-Method 5 Test
1/31	20.8	71	7.4	11.7	159	287	21.9	65	237.3	0.553	485	413	80.7	LEA-Method 5 Test
2/1	20.5	70	6.5	12.0	160	290	17.5	52	354.9	0.827	489	420	79.7	LEA-Method 5 Test
2/2	20.5	70	6.7	11.9	151	273	19.6	58						LEA
2/3	21.1	72	7.1	11.1	174	285	25.3	68						Data from strip chart-LEA
2/4	21.6	74	6.4	11.9	163	267	27.9	75						Data from strip chart-LEA
2/5	21.1	72	7.0	11.7	162	292	23.6	70						LEA
2/6	20.8	71	6.5	11.9	152	274	14.8	44						LEA
2/7														Technician in hospital-no data recorded
2/8														Technician in hospital-no data recorded
2/9														Technician in hospital-no data recorded
2/10														Technician in hospital-no data recorded
2/11														Technician in hospital-no data recorded
2/12	20.5	70	7.7	11.0	171	309	16.8	50						LEA
2/13	20.8	71	7.2	11.7	167	301	17.5	52						LEA
2/14	17.6	60	7.1	11.8	150	270	14.8	44						LEA-Load reduced due to weather
2/15	17.6	60	7.5	11.4	154	278	14.5	43						LEA
2/16	17.9	61	7.0	11.9	153	277	13.8	41						LEA
2/17	21.6	74	6.6	12.1	172	282	18.6	50						LEA-Data from strip chart
2/18	20.2	69	6.9	11.7	167	274	21.6	58						LEA-Data from strip chart
2/19	21.2	72	6.5	12.1	162	265	22.7	61						LEA-Data from strip chart record
2/20	21.1	72	7.0	11.5	164	296	16.8	50						LEA
2/21	17.3	59	7.4	11.3	152	275	16.2	48	163.1	0.380	488	418	81.4	LEA-Method 5 Test
2/21									247.6	0.577	492	426	80.7	LEA-Method 5 Test
2/22	17.6	60	7.4	11.4	164	284	14.8	42	255.8	0.596	489	420	80.1	LEA-Method 5 Test, POM
2/23	14.6	50	10.3	8.8	194	335	31.0	88	182.8	0.426	494	429	77.8	Baseline conditions, Method 5 Test, POM
2/23	14.4	49	10.8	8.4	193	334	31.0	88	220.2	0.513	494	430	76.4	Baseline conditions, Method 5 Test
2/24	16.4	56	9.6	9.6	173	299	25.0	71	297.0	0.69	500	440	76.6	Baseline conditions, Method 5 Test

3.2.1 Gaseous Emissions

During a previous program (Ref. 1), the effect of excess oxygen on NO emissions was evaluated for this boiler. The effect of excess O_2 on NO is shown in Figure 3-1 for an eastern coal fired during the previous program. The boiler demonstrated a significant reduction in NO with decreasing O_2.

During this current program, no provision was made for evaluating the effect of excess O_2 on emissions prior to setting the low NOx condition, since the boiler had been well characterized previously. The boiler was tested initially in the "as found" condition in which the excess O_2 corresponded nearly to that measured previously.

Figure 3-2 is a plot of excess oxygen as a function of boiler load when firing eastern coal. Data from this 30-day field test and the previous test program are presented in this figure for comparison. A solid line is drawn through the points representing the normal O_2 condition. A broken line is drawn through points representing a lower excess air low NOx operation. These data indicate that the effect of boiler load on excess O_2 is similar to that experienced previously. This figure shows the range of O_2 variation possible at each load.

The excess O_2 was then lowered to the minimum practical level based on CO level (approximately 100 ppm), opacity, and clinkering consideration as discussed earlier. The boiler was then maintained at this low O_2 condition for the remainder of the test period. A nearly constant steam load of 20.5 MW output (70,000 lb/hr steam) was maintained for 28 days at which time it was necessary to lower the load to 17.6 MW output (60,000 lb/hr) for six days. The effect of boiler load on NO emissions is shown in Figure 3-3 where data from this program is compared with data measured during a previous program. NO shows an increase with boiler load at a constant excess O_2, but the level of NO is below that measured during the previous program. The differences in NO emissions measurements between this program and the previous program are possibly due to different fuel properties and furnace condition. The boiler heat transfer surfaces had recently been cleaned. The upper curve corresponds to "as found" or

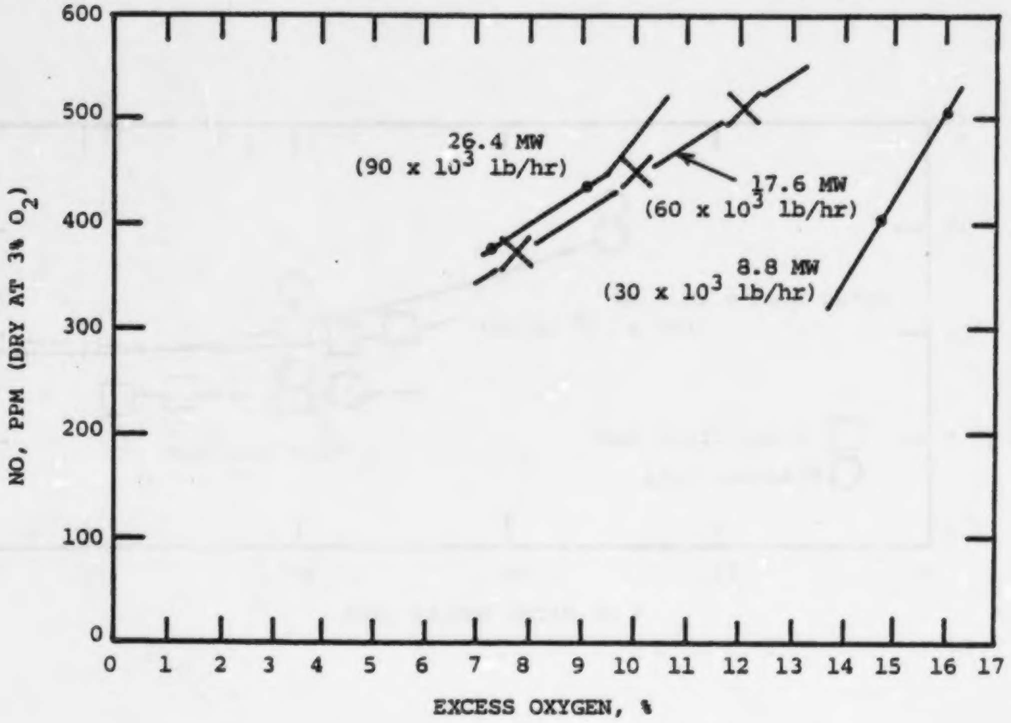


Figure 3-1. Nitric oxide vs excess oxygen, Coal fired spreader Stoker, Site 1. Eastern coal.

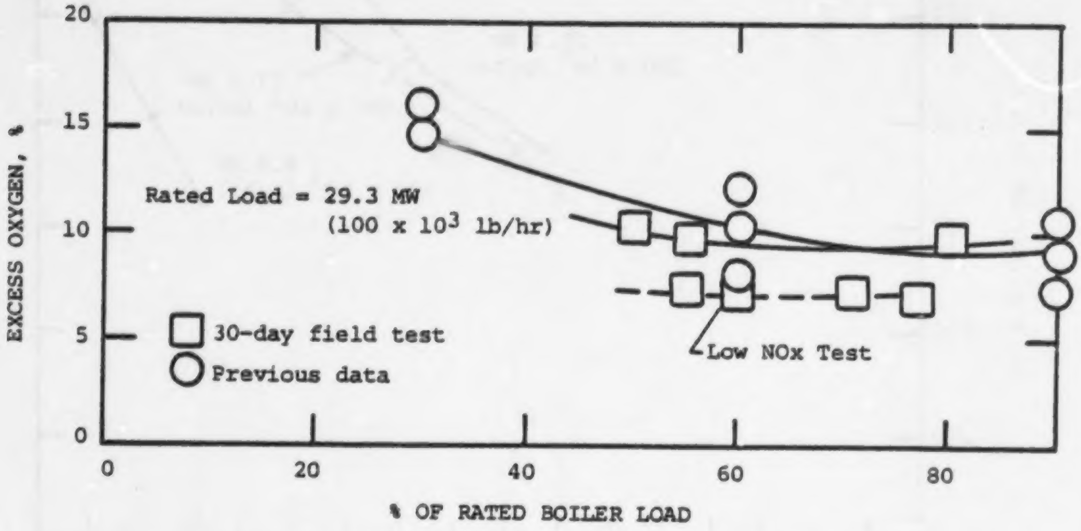


Figure 3-2. Excess oxygen vs boiler load. Coal fired spreader stoker, Site 1. Kentucky coal.

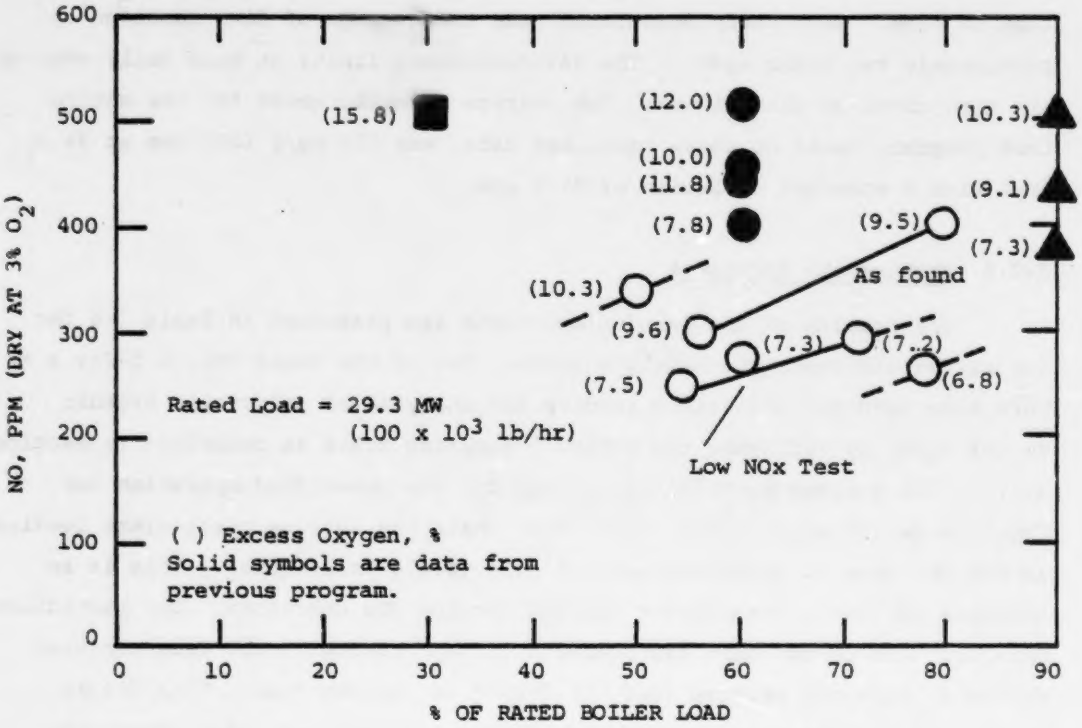


Figure 3-3. Nitric oxide vs boiler load. Coal fired spreader stoker, Site 1. Eastern coal.

baseline operation while the lower curve is the low NOx condition -- operation with low excess air. As these data indicate, reduction of 15 to 30% in NO emissions are possible by controlling the excess air level in the stoker.

The daily average NO measurement is plotted in Figure 3-4 as a function of time. Each daily measurement was the average of five readings approximately two hours apart. The 95% confidence limits on each daily average are also shown on this figure. The average NO measurement for the entire test program, based on these tabulated data, was 178 ng/J (292 ppm at 3% O_2, dry) with a standard deviation of 21.5 ppm.

3.2.2 Particulate Emissions

The results of the particulate tests are presented in Table 3-4 for low excess air tests and baseline tests. Two of the tests (No.'s D-2-I & K) were also used for collecting samples for analysis of polycyclic organic matter (POM) by modifying the Method 5 sampling train as described in Section 2.1.3. The average particulate loading for the unmodified operation was found to be 232 ng/J (0.540 lb/10^6 Btu) while the average particulate loading in the LEA mode of operation was 288 ng/J (0.670 lb/10^6 Btu). This is an increase of 24% in particulate loading for low NOx operation. The particulate data for this 30-day test are compared in Figure 3-5 with the data measured during a previous program (Ref. 1) firing an eastern coal. This figure shows that all the measurements made during a 30-day test were lower than those made during the previous program. The lower particulate loading for this 30-day test is probably due to the lower ash content of the Kentucky coal compared with the previous coal. The average ash content of nine samples was 24% lower than the ash content of the previous coal.

The effect of stack excess oxygen on particulate loading is illustrated in Figure 3-6 for all the particulate tests. The data indicate that the particulate loading is not a function of excess oxygen alone. The data were then plotted as a function of grate pressure drop as shown in Figure 3-7 to determine if this parameter was influencing the particulate loading. This figure shows that in general, increasing grate pressure drop results

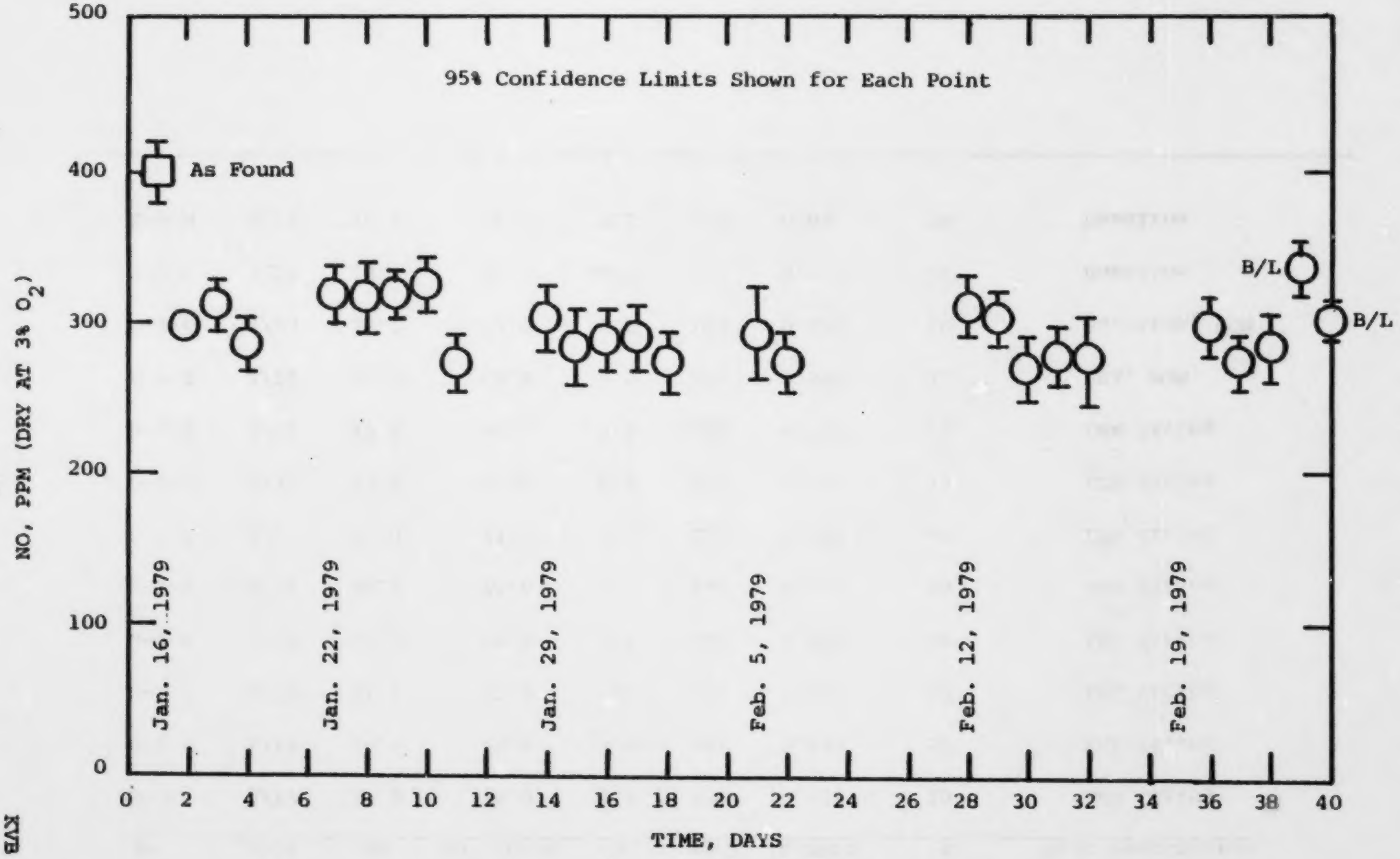


Figure 3-4. NO emissions as a function of time. Coal fired spreader stoker, Site 1.

TABLE 3-4. PARTICULATE DATA SUMMARY SITE 1, COAL FIRED SPREADER STOKER

Test No.	Date 1979	Load MW	Load 10^3 lb/hr	O_2 %	Particulates ng/J	Particulates lb/MBtu	Opacity %	Test Description
D-2-A	1/17	20.5	70.0	6.7	400	0.931	10	LEA firing
D-2-B	1/19	20.5	70.0	7.0	361	0.839	10	LEA firing
D-2-C	1/19	21.1	72.0	7.1	362	0.842	10	LEA firing
D-2-D	1/30	20.2	69.0	7.6	222	0.516	10	LEA firing
D-2-E	1/31	20.5	70.0	7.5	238	0.553	10	LEA firing
D-2-F	2/1	20.8	71.0	6.4	356	0.827	10	LEA firing
D-2-G	2/21	17.9	61.0	6.7	163	0.380	11	LEA firing
D-2-H	2/21	17.6	60.0	7.4	248	0.577	11	LEA firing
D-2-I	2/22	17.9	61.0	6.9	256	0.596	12	LEA, POM
D-2-K	2/23	15.2	52.0	9.8	183	0.426	10	Baseline, POM
D-2-L	2/23	14.4	49.0	10.8	221	0.513	10	Baseline
D-2-M	2/24	16.4	56.0	9.5	297	0.69	10	Baseline

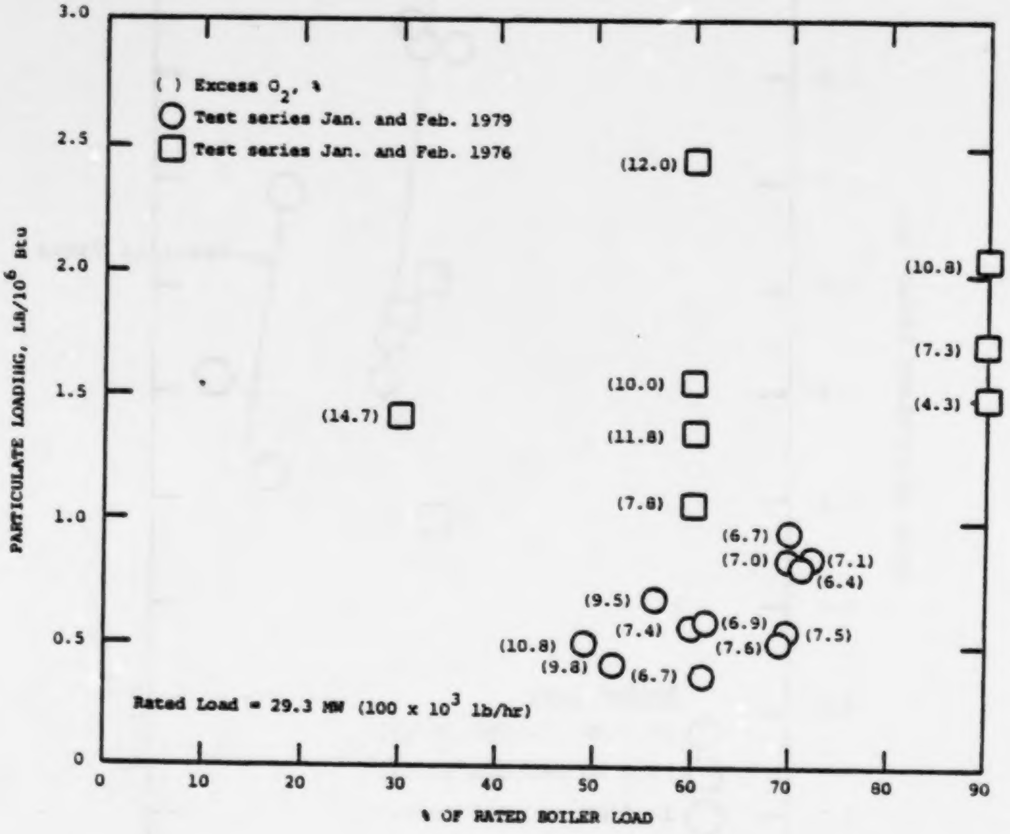


Figure 3-5. Particulate loading vs boiler load, Coal fired Stoker, Site 1.

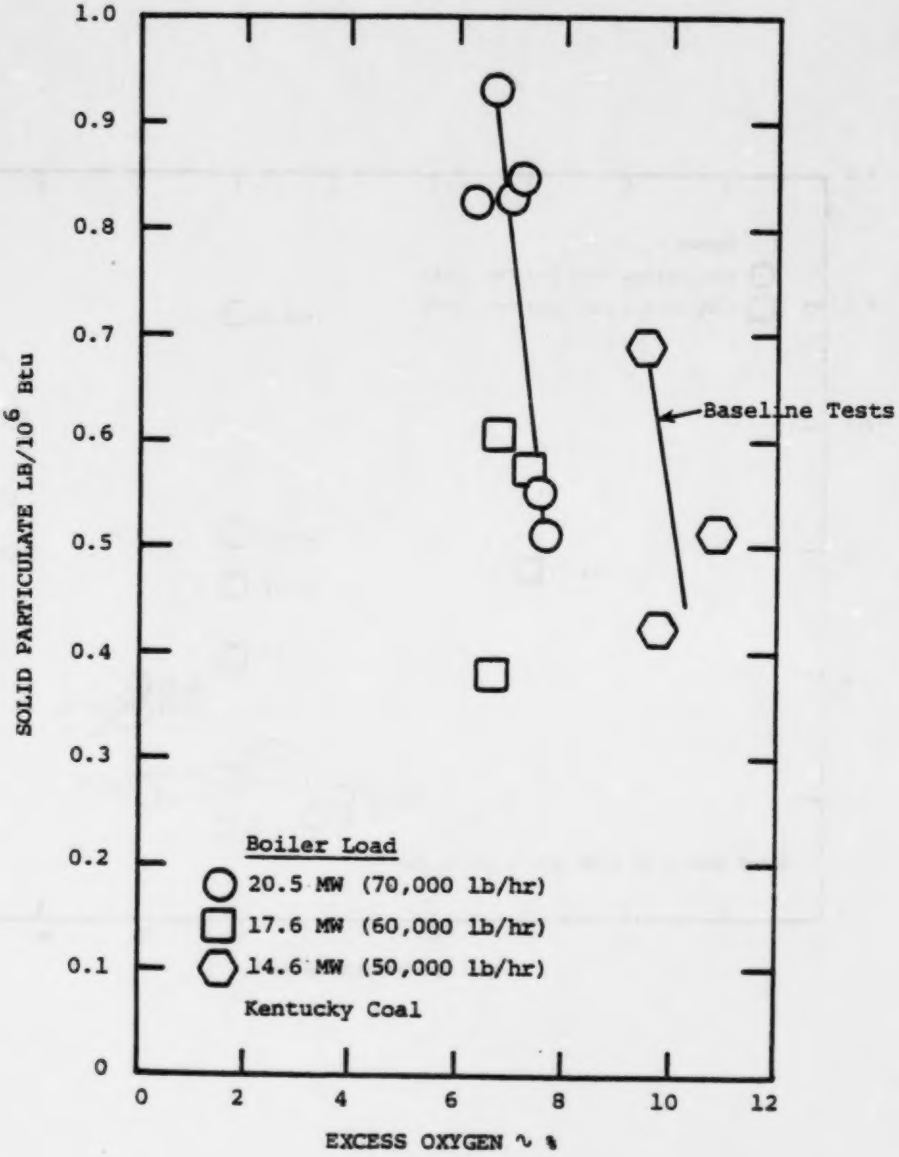


Figure 3-6. Particulate loading as a function of excess oxygen. Coal fired stoker, Site 1.

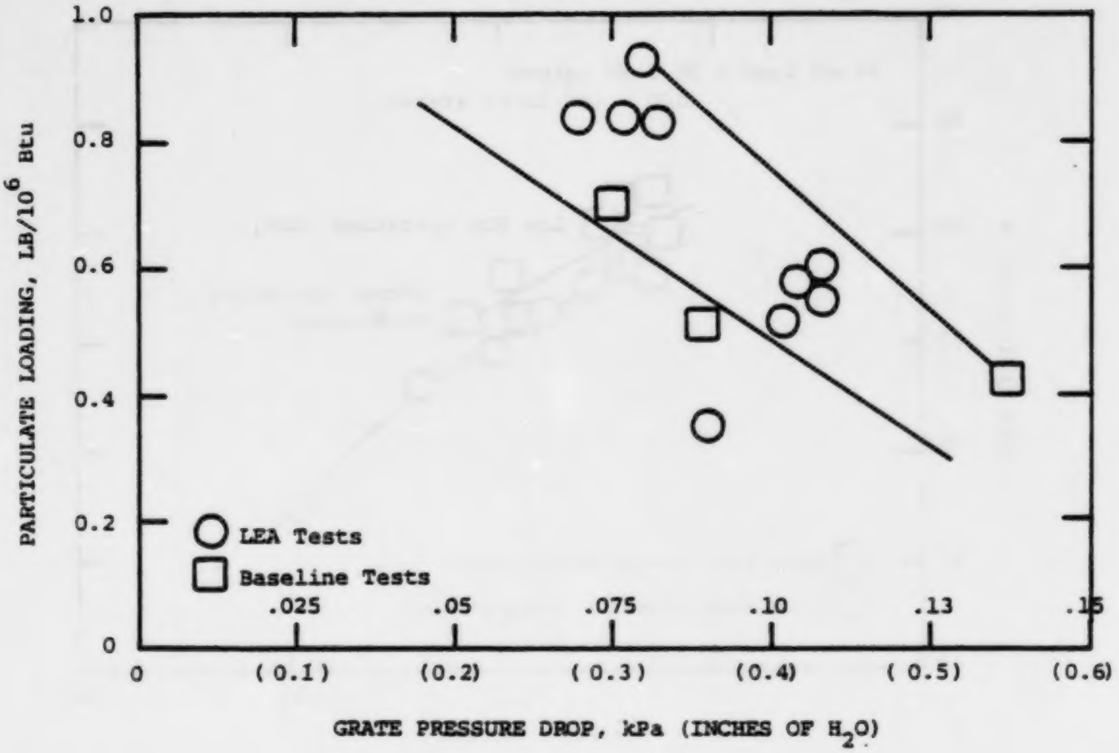


Figure 3-7. Particulate loading as a function of grate pressure drop. Coal fired spreader stoker, Site 1.

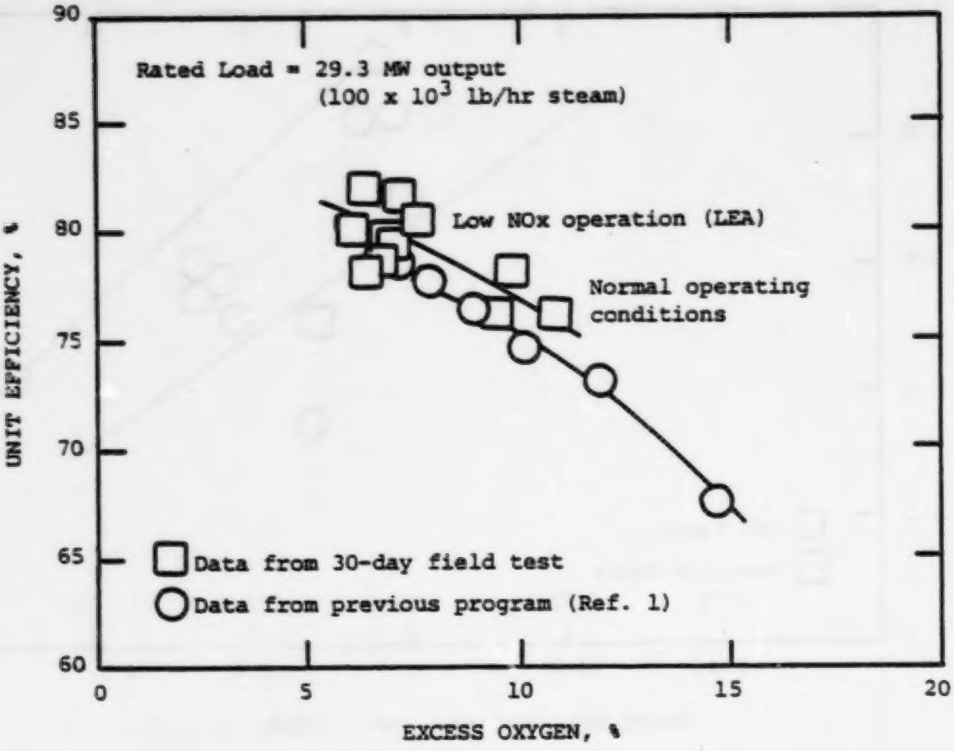


Figure 3-8. Boiler efficiency vs excess O_2. Coal fired spreader stoker, Site 1.

in lower particulate loading. Higher grate pressure drop is, at a given air flow rate, usually associated with thicker, uniform beds while lower pressure drop is a result of thinner and/or non-uniform beds. Non-uniform bed thickness or open patches of grate area are usually a result of clinkering, fuel properties, stoker settings, and other variables.

Opacity measurements were made with a transmissometer permanently installed in the duct leading to the stack. In addition, a portable opacity monitor described in Section 2.1.4 was installed to monitor the opacity and to provide a check on the installed plant transmissometer. Four boilers at this test site exhaust into a common stack. At the time of this test, one boiler was off line and one boiler was firing natural gas so that only two boilers were firing coal. No visible emissions were observed from the stack during the duration of the test.

3.2.3 POM Emissions

Samples for analysis of polycyclic organic matter were collected downstream of the multiclone using a Method 5 sampling train with XAD-2, a POM absorber, inserted. Sample time was extended to two hours to provide a large enough sample for Battelle to analyze. Following the sampling period, the organic resin module was sealed and returned to Battelle Columbus Laboratories for analysis. The sampling probe and glassware were washed with a 50-50 mixture of methylene chloride and methenol per Battelle instructions. The filter and wash were also sent to Battelle following weighing.

These samples were analyzed by capillary-EI GC-MS utilizing a 30M SE-52 column with hydrogen as a carrier gas. All data was collected by single ion monitoring (SIM) to improve selectivity and sensitivity.

The results of the analyses are presented in μg per total sample. The quantitative detection limit was 0.5 μg, thus samples with POM's present levels lower than this are reported as <0.5 μg (the standard deviation at lower levels was prohibitively high for accurate quantitation). Samples reporting POM values of ND (none detected) are at a level of less than 0.1 μg (the approximate qualitative detection limit). The standard deviation on points around 0.5 μg averaged around ± 20%, at levels around 5 μg it averaged around ± 15%, and at levels about 12 μg the standard deviation averaged around ± 10%.

TABLE 3-5. SUMMARY OF POM ANALYSES FOR SITE 1 - COAL FIRED SPREADER STOKER

	LOW NOx TEST								BASE LINE TEST							
	XAD-2		FILTER		PROBE WASH		TOTAL		XAD-2		FILTER		PROBE WASH		TOTAL	
PAH	µg	µg/m^3	µg	µg/m^3	µg	µg/m^3	µg	µg/m^3	µg	µg/m^3	µg	µg/m^3	µg	µg/m^3	µg	µg/m^3
Phenanthrene	1.0	0.59	0.9	0.53	1.0	0.59	2.9	1.71	1.1	0.65	<0.5	<.30	0.5	0.30	1.6<2.1	.95<1.25
Anthracene	<0.5	<.29	<0.5	<.29	<0.5	<.29	<1.5	<.88	<0.5	<.30	<0.5	<.30	<0.5	<.30	<1.5	<.89
Methyl Anthracenes/Phenanthrenes	<0.5	<.29	<0.5	<.29	0.5	0.29	.5<1.5	.29<.88	0.5	0.30	ND	-	<0.5	<.30	.5<1.0	.3<.59
Fluoranthene	0.6	0.35	0.5	0.29	<0.5	<.29	1.1<1.6	.65<.94	0.6	0.36	<0.5	<.30	<0.5	<.30	.6<1.6	.36<.95
Pyrene	0.5	0.29	<0.5	<.29	<0.5	<.29	.5<1.5	.29<.88	<0.5	<.30	<0.5	<.30	<0.5	<.30	<1.5	<.89
Methyl Pyrene/Fluoranthene	<0.5	<.29	<0.5	<.29	<0.5	<.29	<1.5	<.88	<0.5	<.30	<0.5	<.30	<0.5	<.30	<1.5	<.89
Benzo(c)phenanthrene	<0.5	<.29	ND	-	<0.5	<.29	<1.0	<.59	<0.5	<.30	ND	-	<0.5	<.30	<1.0	<.59
Benz(a)anthracene	<0.5	<.29	<0.5	<.29	ND	-	<1.0	<.59	<0.5	<.30	<0.5	<.30	ND	-	<1.0	<.59
Chrysene	<0.5	<.29	<0.5	<.29	<0.5	<.29	<1.5	<.88	<0.5	<.30	<0.5	<.30	<0.5	<.30	<1.0	<.59
Methyl Chrysenes	<0.5	<.29	<0.5	<.29	<0.5	<.29	<1.5	<.88	<0.5	<.30	<0.5	<.30	<0.5	<.30	<1.0	<.59
7,12 Dimethylbenz(a)anthracene	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-
Benzofluoranthenes	0.5	0.29	0.5	0.29	0.5	0.29	1.5	.88	<0.5	<.30	<0.5	<.30	<0.5	<.30	<1.5	<.89
Benzo(a)pyrene	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-
Benzo(e)pyrene	<0.5	<.29	0.5	0.29	ND	-	ND	-	<0.5	<.30	<0.5	<.30	ND	-	<1.0	<.59
Perylene	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-
Methylbenzopyrenes	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-
3-Methylcholanthrene	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-
Indeno(1,2,3-cd)pyrene	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-
Benzo(g,h,i)perylene	<0.5	<.29	0.6	0.35	<0.5	<.29	.6<1.6	.35<.94	<0.5	<.30	<0.5	<.30	<0.5	<.30	<1.5	<.89
Dibenz(a,h)anthracene	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-
Dibenzo(c,g)carbazole	ND	-	0.5	0.29	ND	-	ND	-	ND	-	<0.5	<.30	<0.5	<.30	<1.0	<.59
TOTAL, µg/m^3		1.5<4.1				1.2<3.2		4.2<10.1		1.3<4.3				.3<3.6		1.6<10.8
Sample volume (m^3)	------------1.698------------								------------1.686------------							

The results of the Battelle analyses are presented in Table 3-5 for the low NOx and baseline operating conditions. The POM analyses for the low NOx condition are presented in the first 8 columns for the XAD-2 module, the filter, the probe wash and total. The corresponding data for the unmodified condition are shown in the last eight columns. Only a small difference between the two conditions is evident and that is only for one component, phenanthrene.

3.2.4 Boiler Efficiency

Boiler efficiency calculations were made for as found and low NOx operating conditions. The ASME Abbreviated Efficiency Test method was used to determine the boiler efficiency. This test method is described in Appendix A.

Coal, fly ash, and bottom ash samples were collected during each particulate test. Coal samples were submitted to an independent laboratory for proximate, ultimate, and heating value analyses. Fly ash samples were analyzed for carbon, carbonates, and heating value. The bottom ash was analyzed only for carbon content. The bottom ash with the highest carbon content would not ignite, therefore the determination of the heat of combustion was not attempted on the remaining bottom ash samples with lower carbon content. The results of the coal, fly ash, and bottom ash analyses are tabulated in Table 3-6. The data are tabulated chronologically and indicate that the ash content of the coal changed significantly in the last three samples.

Combustible losses were calculated using the ash content of the fuel, the particulate loading, and the ash heating value. The fly ash was determined from the flue gas particulate loading, an assumed multiclone collection efficiency of 70% and fuel flow rate. The total ash was determined from the fuel analysis and the fuel flow rate. Bottom ash was the difference between total ash and fly ash. A mass weighted heating value of dry refuse was then calculated and used for determining the combustible losses. Table 3-7 lists a summary of the boiler efficiencies. It is apparent from the data presented in this table that LEA operation results in an efficiency increase of about 3% with the primary contribution due to dry gas losses. This is seen by comparing the first nine columns of data at LEA with the last three columns for normal excess air.

TABLE 3-6. SUMMARY OF COAL AND ASH ANALYSES FROM SITE 1

COAL	1/16/79 Test D-1,D-2-A	1/19/79 Test D-2-B,C	1/30/79 Test D-2-D	1/31/79 Test D-2-E	2/1/79 Test D-2-F	2/21/79 Test D-2-G,H	2/22/79 Test D-2-I	2/23/79 Test D-2-K,L	2/24/79 Test D-2-M
Proximate Analysis:									
Moisture, %	7.70	9.27	7.23	7.41	7.08	5.60	7.11	5.14	7.10
Volatile Matter, %	42.99	40.03	40.28	42.17	41.23	43.66	38.28	40.58	38.81
Ash, %	8.26	7.94	6.84	7.07	7.07	5.23	11.59	10.66	11.04
Fixed Carbon, %	41.05	42.76	45.65	43.35	44.62	45.51	43.02	43.62	43.05
Ultimate Analysis:									
Moisture, %	7.70	9.27	7.23	7.41	7.08	5.60	7.11	5.14	7.10
Carbon, %	70.78	71.08	66.13	66.39	67.52	69.38	63.84	66.04	65.13
Hydrogen, %	5.13	5.29	4.71	4.82	5.02	5.06	4.60	4.97	4.74
Nitrogen, %	1.27	1.29	1.42	1.34	1.35	1.38	1.30	1.35	1.32
Sulfur, %	3.03	2.99	2.80	3.59	2.77	2.55	5.09	3.40	3.25
Ash, %	8.26	7.94	6.84	7.07	7.07	5.23	11.59	10.66	11.04
Oxygen, % (by difference)	3.83	2.14	10.87	9.38	9.19	10.80	6.47	8.44	7.42
Heat of Combustion:									
Gross Btu/lb	11,920	12,630	12,450	12,410	12,400	12,970	11,670	12,130	11,770
Net Btu/lb	11,480	12,180	12,010	11,960	11,940	12,500	11,240	11,670	11,330
ASH									
Fly Ash:									
Carbon, %	45.65	39.05	41.55	63.77	47.91	31.07	56.08	37.31	49.02
Carbonates, (% C)	0.42	0.83	1.26	1.88	0.59	0.55	0.82	0.49	0.34
Gross Btu/lb	6,520	6,670	7,350	7,940	9,000	6,660	7,710	6,310	7,850
Bottom Ash:									
Carbon, %	8.0	5.0	1.9	2.2	5.1	4.6	3.9	8.3	7.1

TABLE 3-7. SUMMARY OF BOILER EFFICIENCY CALCULATIONS FOR SITE 1, COAL FIRED STOKER BOILER

Test No. Date	D-2-A 1/17/79	D-2-B 1/19/79	D-2-C 1/19/79	D-2-D 1/30/79	D-2-E 1/31/79	D-2-F 2/1/79	D-2-G 2/21/79	D-2-H 2/21/79	D-2-I 2/22/79	D-2-K 2/23/79	D-2-L 2/23/79	D-2-M 2/24/79
Test Load												
10^3 lb/hr	70	70	72	69	70	71	61	60	61	52	49	56
MW	20.5	20.5	21.1	20.2	20.5	20.8	17.1	17.6	17.9	15.2	14.4	16.4
% of Capacity	70	70	72	69	70	71	61	60	61	52	49	56
Stack O_2, %	6.7	7.0	7.1	7.1	7.4	6.4	6.7	7.4	6.9	9.8	10.8	9.5
Stack CO, ppm	52	64	60	52	65	67	49	42	40	82	96	74
Stack Temp. (K/°F)	494/430	489/420	489/420	489/420	485/413	489/420	488/418	492/426	489/420	494/429	494/430	500/440
Ambient Temp. (K/°F)	264/15	266/18	267/20	266/18	264/16	267/20	273/32	273/32	276/36	276/36	274/34	269/25
Boiler Heat Losses												
Dry Gas	11.94	11.39	11.33	10.41	10.96	10.78	10.85	11.16	11.21	14.15	15.36	14.29
Moisture in Fuel	0.81	0.92	0.92	0.73	0.75	0.71	0.54	0.54	0.76	0.53	0.53	0.76
Moisture from H_2	4.86	4.72	4.72	4.26	4.36	4.56	4.39	4.39	4.42	4.61	4.62	4.57
Combustibles	2.02	1.89	1.89	1.26	1.47	2.49	0.85	1.28	1.57	0.88	1.05	1.82
Radiation	0.77	0.77	0.78	0.77	0.77	0.77	0.95	0.95	0.95	1.0	1.0	0.98
Total Losses	21.41	20.68	20.62	18.43	19.31	20.30	18.58	19.31	19.91	22.17	23.57	23.42
Boiler Efficiency, %	78.59	79.32	79.38	81.57	80.69	79.70	81.42	80.69	80.09	77.83	76.43	76.58

Figure 3-8 shows unit efficiency as a function of excess oxygen for the boiler. This figure clearly illustrates the effect that LEA firing has on boiler efficiency. This curve shows that efficiency increases approximately 1% for each 1% decrease in excess oxygen. The data from the previous program are also shown in this figure. The unit efficiency is slightly lower, probably due to differences in fuel but shows the same trend. The effect of boiler load on unit efficiency is shown in Figure 3-9. Under low NOx operation little effect of load on efficiency is shown.

3.2.5 Data Reduction

The gaseous emissions data measured by the analyzers were recorded on strip chart recorders as described earlier. An automatic data logger was ordered but was not available for this 30-day test. The only alternative was manual reduction of strip chart records and punched cards for computer data input. This procedure required a very large manpower effort to produce the data required for analysis.

Strip chart records were collected from the recorders along with copies of the appropriate control room data logs. The recorder charts were reviewed to detect any possible data gaps. In addition, the strip chart records were verified by comparison with measurements recorded by a technician on a two-hour basis.

A tabulation of 15-minute averages was compiled for the entire test period. After the data were compiled, they were spot checked and edited to detect obvious errors and anomalies. The data were then keypunched on cards for input to the computer. Figure 3-10 shows an example of the list of 15-minute averages. The entire list of 15-minute averages is presented in Appendix F.

After data editing was completed, 24-hour averages were calculated. For an average to be valid, at least 75 percent of the 15-minute points in that interval had to be valid. Figure 3-11 shows a summary of the 24-hour averages for the 30-day test at Site 1.

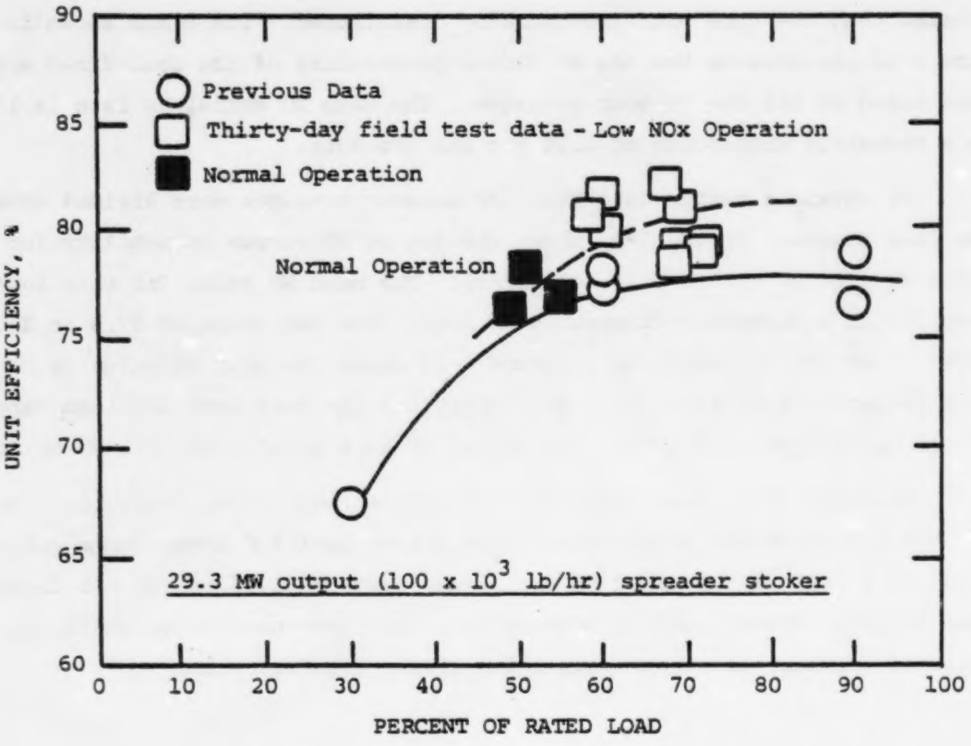


Figure 3-9. Efficiency vs load, Site 1, coal fired spreader stoker.

A statistical summary was prepared to determine the following parameters for the 24-hour averages: mean, standard deviation, maximum, minimum, range and average deviation. These parameters were calculated assuming the data were normally distributed. When the data were plotted on normal probability paper it was apparent that the data were not normally distributed. Further analysis indicated that the data were log-normally distributed. The graph shown in Figure 3-12 illustrates the log NO versus probability of the coal-fired spreader stoker based on all the 24-hour averages. The mean NO emissions rate is 170 ng/J with a geometric dispersion of 1.18 for all the data.

To obtain a better data fit, the 24-hour averages were divided into two steam flow ranges. Figure 3-12 shows the log of NO versus probability for 20.5 to 23.2 MW (70,000 - 79,000 lb. steam/hr). The mean NO value for this level is 170 ng/J with a geometric dispersion of 1.08. For the range of 17.6 to 20.5 MW (60,000 to 69,000 lb. steam/hr), Figure 3-13 shows the mean NO value to be 168 ng/J with a geometric dispersion of 1.06. Splitting the data into two load ranges resulted in 24 days at 20.5 to 23.2 MW and 10 days at 17.6 to 20.5 MW boiler load.

Emissions were also measured at baseline (unmodified) conditions at the start and finish of the 30-day test. The boiler load for these tests was 23.4 MW (80,000 lb/hr) at the start of the 30 day test and 14.5 MW (50,000 lb/hr) at the finish. These baseline measurements were then used to estimate the unmodified emission at other loads using linear interpolation.

```
***************************************************************************************
**                                15 MIN. DATA                                       **
**                          DRY STACK GAS CONCENTRATION                              **
**                                                                                   **
**                          O2     CO2     CO      NO      CO      NO     CO     NO  **
**                   LOAD   VOL%   VOL%    PPMV    PPMV    PPMV    PPMV   NG/J   NG/J**
**   DATE     TIME   MWTH   MEAS   MEAS    MEAS    MEAS    3%O2    3%O2              **
***************************************************************************************
** 1/16/79    1315   23.4    9.2    9.6     53.    269.     81.    412.    29.   242. **
** 1/16/79    1330   23.4    9.0    9.6     52.    269.     78.    405.    28.   238. **
** 1/16/79    1345   23.4    9.3    9.7     52.    263.     80.    406.    29.   238. **
** 1/16/79    1400   23.4    8.8    9.3     44.    271.     65.    401.    23.   235. **
** 1/16/79    1415   23.4    9.5   10.0     44.    254.     69.    399.    25.   234. **
** 1/16/79    1430   23.4    9.5    9.1     50.    255.     79.    400.    28.   235. **
** 1/16/79    1445   23.4    9.3    9.1     60.    242.     93.    373.    33.   219. **
** 1/16/79    1500   23.4    9.5    9.3     70.    235.    110.    369.    39.   217. **
** 1/16/79    1515   23.4    9.4    9.3     70.    243.    109.    378.    39.   222. **
** 1/16/79    1530   23.4    9.3    9.3     70.    244.    108.    377.    39.   221. **
** 1/16/79    1545   23.4    8.8    9.3     60.    253.     89.    374.    32.   220. **
** 1/16/79    1600   23.4    9.7    6.9     60.    258.     96.    414.    34.   243. **
** 1/16/79    1615   23.4    9.9    9.8     67.    244.    109.    397.    39.   233. **
** 1/16/79    1630   23.4    9.7    9.1     59.    245.     94.    392.    34.   230. **
** 1/16/79    1645   23.4    9.2    9.1     61.    248.     94.    381.    33.   224. **
** 1/16/79    1700   23.4    9.5    9.2     62.    256.     97.    402.    35.   236. **
** 1/16/79    1715   23.4    9.3    9.1     65.    269.    100.    415.    36.   244. **
** 1/16/79    1730   23.4    9.6    9.3     67.    268.    106.    425.    38.   249. **
** 1/16/79    1745   23.4    9.9    9.6     79.    270.    129.    439.    46.   258. **
** 1/16/79    1800   23.4    9.7    9.1     89.    273.    142.    436.    51.   256. **
** 1/16/79    1815   23.4    9.7    9.6     71.    271.    113.    433.    41.   254. **
** 1/16/79    1830   23.4    9.8    9.5     70.    273.    113.    440.    40.   258. **
** 1/16/79    1845   23.4    9.9    9.3     70.    278.    114.    452.    41.   266. **
** 1/16/79    1900   23.4    9.4    9.3     70.    284.    109.    442.    39.   260. **
** 1/16/79    1915   23.4    9.4    9.3     70.    281.    109.    437.    39.   257. **
** 1/16/79    1930   23.4    9.3   10.3     71.    270.    110.    417.    39.   245. **
** 1/16/79    1945   23.4    9.4   10.3     60.    268.     93.    417.    33.   245. **
** 1/16/79    2000   23.4    9.6   10.3     58.    266.     92.    421.    33.   247. **
** 1/16/79    2015   23.4    9.4   10.3     60.    272.     93.    423.    33.   249. **
** 1/16/79    2030   23.4    9.4   10.3     58.    266.     90.    414.    32.   243. **
** 1/16/79    2045   23.4    9.4   10.3     54.    270.     84.    420.    30.   247. **
** 1/16/79    2100   23.4    9.1   10.3     50.    274.     76.    416.    27.   244. **
** 1/16/79    2115   23.4    9.4   10.3     49.    260.     76.    405.    27.   238. **
** 1/16/79    2130   23.4    9.0   10.3     46.    274.     69.    412.    25.   242. **
** 1/16/79    2145   23.4    8.9   10.5     48.    280.     72.    418.    26.   245. **
** 1/16/79    2200   23.4    8.9   10.5     48.    290.     72.    433.    26.   254. **
** 1/16/79    2215   23.4    9.0   10.8     50.    290.     75.    436.    27.   256. **
** 1/16/79    2230   23.4    9.0   10.8     51.    298.     77.    448.    27.   263. **
** 1/16/79    2245   23.4    9.0   10.8     52.    294.     78.    442.    28.   260. **
** 1/16/79    2300   23.4    9.0   10.8     49.    284.     74.    427.    26.   251. **
** 1/16/79    2315   23.4    9.0   10.8     41.    289.     62.    435.    22.   255. **
** 1/16/79    2330   23.4    9.0   10.5     46.    280.     69.    421.    25.   247. **
** 1/16/79    2345   23.4    8.8   10.5     49.    278.     72.    411.    26.   241. **
** 1/16/79       0     .0     .0     .0      0.      0.      0.      0.     0.     0. **
** 1/16/79       0     .0     .0     .0      0.      0.      0.      0.     0.     0. **
** 1/16/79       0     .0     .0     .0      0.      0.      0.      0.     0.     0. **
** 1/16/79       0     .0     .0     .0      0.      0.      0.      0.     0.     0. **
** 1/16/79       0     .0     .0     .0      0.      0.      0.      0.     0.     0. **
***************************************************************************************
```

Figure 3-10. Format of 15-Minute Emissions Data

24 HOUR DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
1/16/79		23.5	9.3	9.8	59.	264.	90.	406.	32.	239.
1/17/79		21.7	7.8	11.7	39.	246.	53.	336.	19.	197.
1/18/79		20.5	7.1	12.3	52.	231.	67.	299.	24.	176.
1/19/79		20.5	6.9	12.0	64.	225.	82.	286.	29.	168.
1/20/79		20.6	7.5	11.5	62.	229.	82.	307.	29.	180.
1/21/79		21.0	7.8	11.3	66.	237.	90.	323.	32.	190.
1/22/79		20.7	7.5	11.5	48.	237.	63.	315.	23.	185.
1/23/79		20.1	7.9	11.0	51.	229.	70.	315.	25.	185.
1/24/79		21.1	7.8	11.1	52.	235.	70.	320.	25.	188.
1/25/79		21.3	7.4	11.8	51.	233.	68.	310.	24.	182.
1/26/79		21.2	7.4	11.9	57.	216.	75.	287.	27.	169.
1/27/79		20.1	7.6	11.6	55.	224.	74.	301.	26.	177.
1/28/79		20.4	7.9	11.6	62.	228.	85.	313.	30.	184.
1/29/79		20.5	7.6	11.6	59.	229.	79.	307.	28.	181.
1/30/79		21.0	7.1	12.1	64.	223.	83.	289.	30.	170.
1/31/79		20.6	7.4	11.4	49.	221.	64.	292.	23.	172.
2/ 1/79		21.1	6.5	11.9	60.	228.	74.	282.	26.	166.
2/ 2/79		20.4	6.8	11.8	64.	218.	80.	277.	29.	162.
2/ 3/79		21.1	6.9	11.7	76.	213.	97.	273.	35.	160.
2/ 4/79		21.6	6.5	12.3	76.	211.	94.	262.	34.	154.
2/ 5/79		22.2	6.6	12.3	85.	222.	107.	278.	38.	163.
2/ 6/79		21.2	6.8	12.0	74.	220.	93.	279.	33.	164.
2/ 7/79		20.8	7.2	11.7	45.	220.	58.	288.	21.	169.
2/12/79		20.4	7.9	11.0	35.	230.	48.	316.	17.	185.
2/13/79		20.7	7.5	11.4	42.	231.	56.	308.	20.	181.
2/14/79		19.8	7.2	11.7	40.	212.	52.	278.	19.	163.
2/15/79		18.0	7.1	11.9	34.	210.	44.	273.	16.	160.
2/16/79		19.1	6.9	12.3	35.	214.	45.	274.	16.	161.
2/17/79		21.6	6.3	12.5	46.	221.	57.	271.	20.	159.
2/18/79		20.2	6.5	12.0	48.	218.	60.	271.	22.	159.
2/19/79		21.2	6.0	12.2	51.	221.	62.	265.	22.	155.
2/20/79		20.7	6.8	11.9	52.	217.	66.	276.	24.	162.
2/21/79		17.8	7.9	11.1	39.	203.	54.	279.	19.	164.
2/22/79		18.0	7.8	11.2	46.	202.	62.	277.	22.	163.
2/23/79		14.5	9.6	9.8	45.	193.	72.	306.	26.	180.
2/24/79		16.6	8.5	10.8	46.	187.	67.	270.	24.	159.

Figure 3-11. Summary of 24-hour Average Data

Emission factors for the coal-fired stoker were calculated using the procedure set forth in 40CFR60, Subpart D. The NO emission factor (dry basis) was calculated using the following equation:

$$E = C_d F_d \frac{20.9}{20.9 - \% O_{2_d}}$$

Where E = Pollutant emission rate, ng/J (lb/million Btu)

C_d = NO concentration, ng/scm (lb/scf)

F_d = Stoichiometric conversion factor, 2.63×10^{-7} dscm/J (9,780 dscf/million Btu), for bituminus coal

O_{2_d} = Oxygen concentration, percent by volume, dry

The conversion of measured NO values (ppmv) to ng/scm is made by multiplying by 1.912×10^6. To convert from ppm to lb/scf, multiply by 1.19×10^{-7}.

NO_x emissions are measured as NO and the NO_x emission rates reported herein are calculated based on the molecular weight of NO_2.

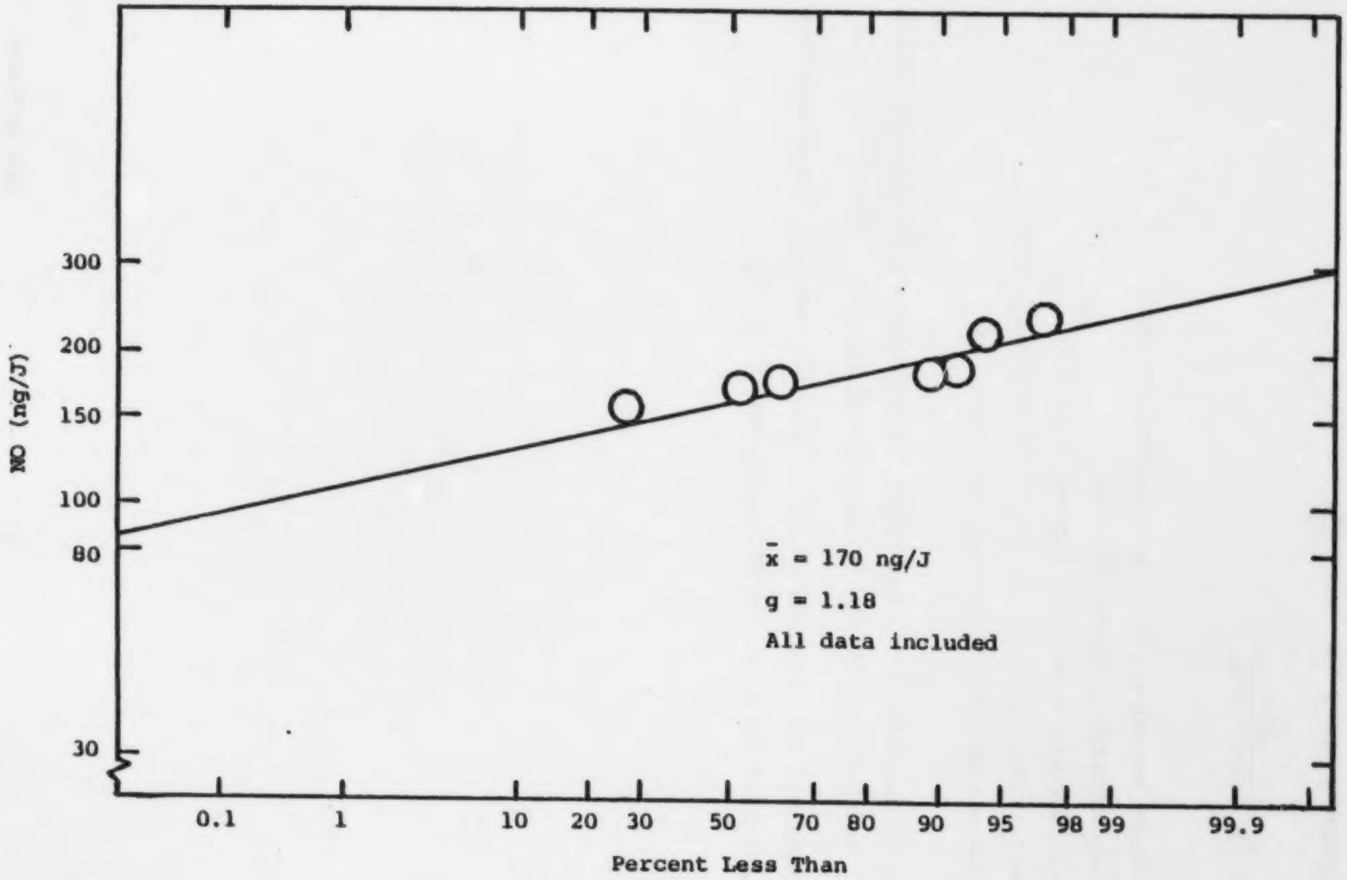


Figure 3-12. Coal-Fired Spreader-Stoker, Site 1, NO Emissions.

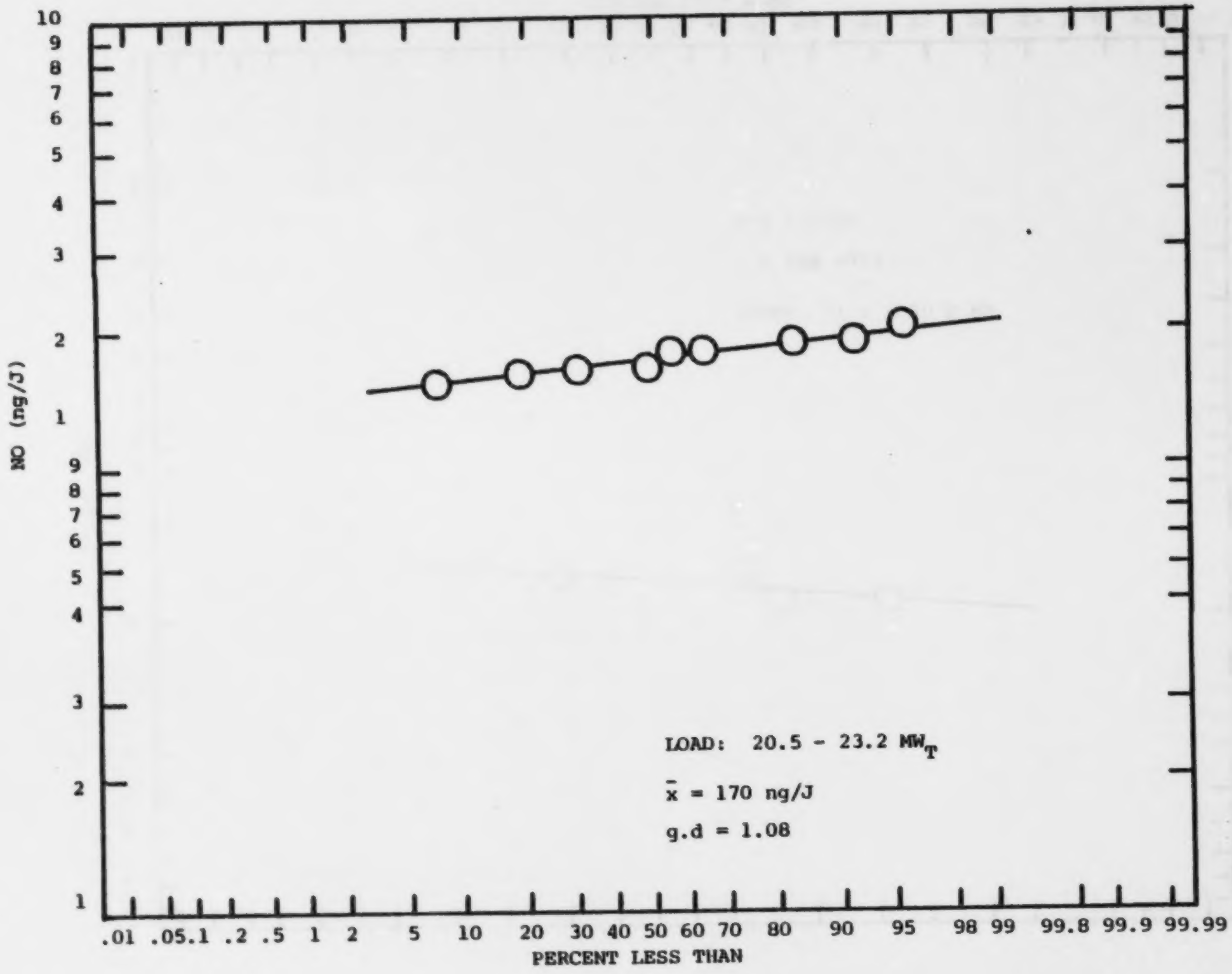


Figure 3-13. Coal-Fired Spreader Stoker, Site 1, NO Emissions

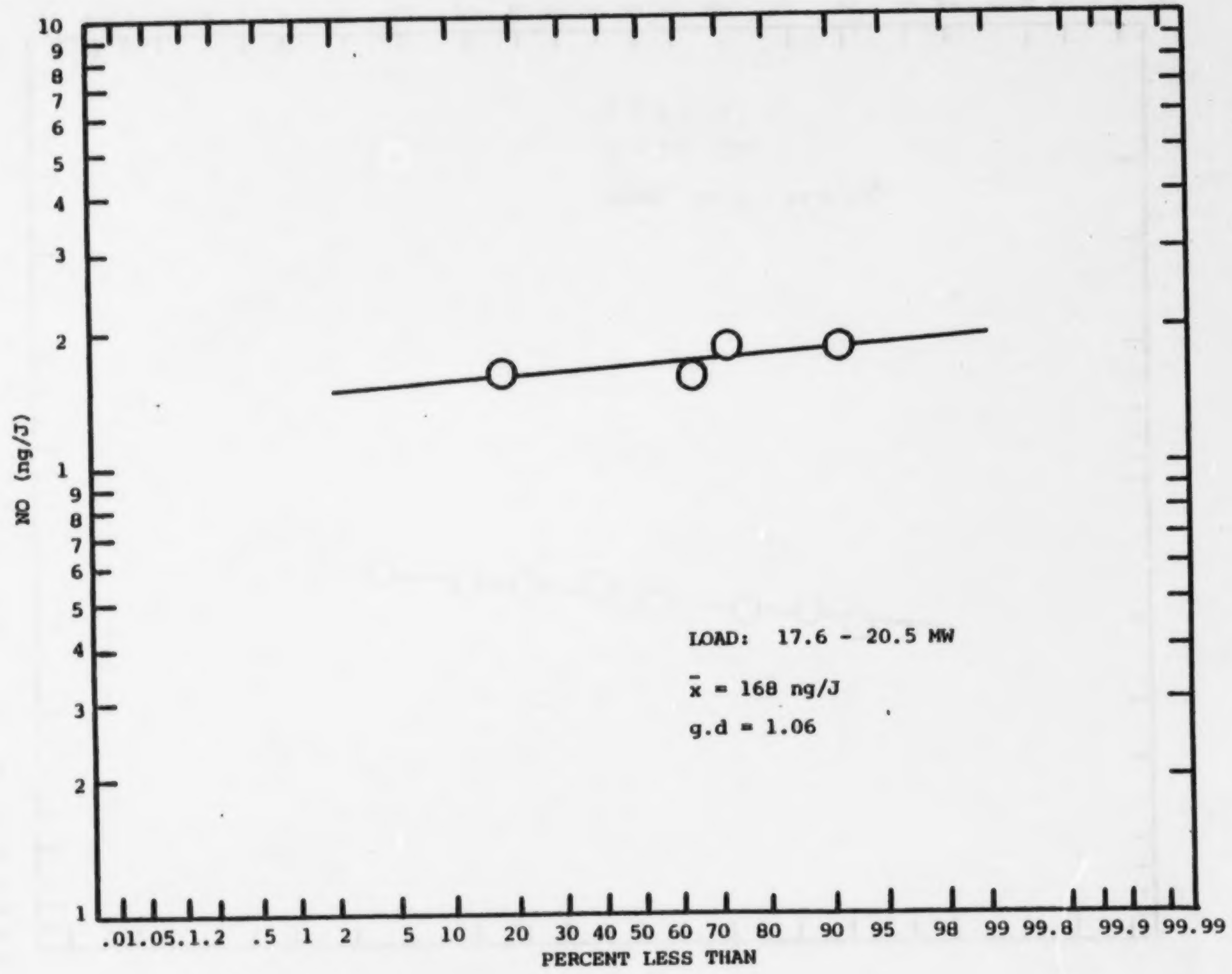


Figure 3-14. Coal Fired Spreader Stoker, Site 1, NO Emissions

SECTION 4.0

REFERENCES

1. Maloney, K. L., et al., "Systems Evaluation of the Use of Low-Sulfur Western Coal in Existing Small and Intermediate-Sized Boilers," EPA Contract No. 68-02-1863, EPA 600/7-78-153a.

2. Cato, G. A., et al., "Field Testing: Application of Combustion Modifications to Control Pollutant Emissions from Industrial Boilers - Phase I," EPA 650/2-74-078a, NTIS No. PB 238 920, June 1975.

3. Cato, G. A., et al., "Field Testing: Application of Combustion Modifications to Control Emissions from Industrial Boilers - Phase II," EPA 600/2-76-086a, NTIS No. PB 253 500, April 1976.

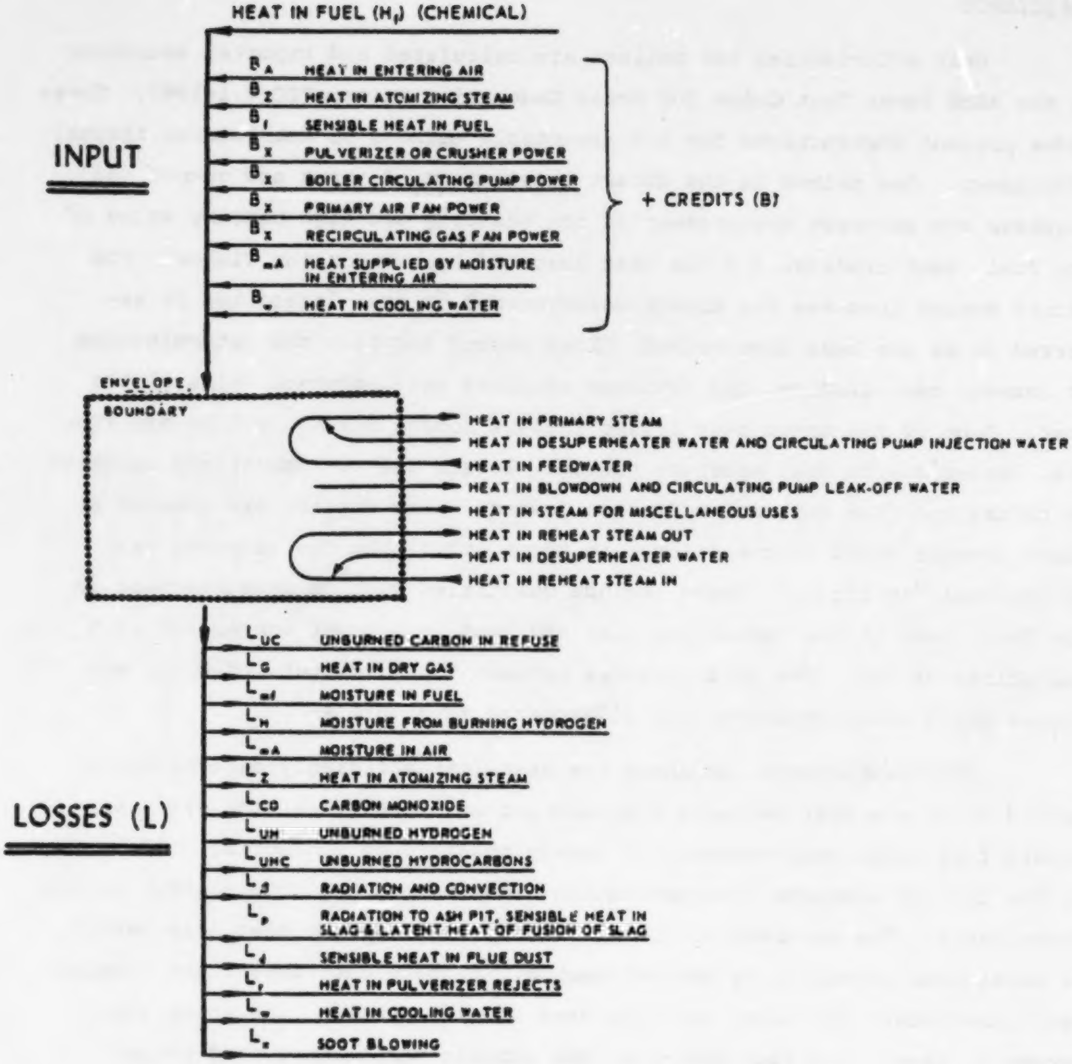
APPENDIX A

EFFICIENCY MEASUREMENTS

EFFICIENCY

Unit efficiencies for boilers are calculated and reported according to the ASME Power Test Codes for Steam Generation Units, PTC 4.1-1965. These codes present instructions for two acceptable methods of determining thermal efficiency. One method is the direct measurement of input and output and requires the accurate measurement of the quantity and high-heating value of the fuel, heat credits, and the heat absorbed by the working fluids. The second method involves the direct measurements of heat losses and is referred to as the heat loss method. This method requires the determination of losses, heat credits, and ultimate analysis and high-heat value of the fuel. Some of the major heat losses include losses due to heat in dry flue gas, losses due to fuel moisture content, losses due to combustible material in refuse and flue gas, and radiation losses. Heat credits are defined as those amounts added to the process in forms other than the chemical heat in the fuel "as fired." These include quantities such as sensible heat in the fuel, heat in the combustion air, and heat from power conversion in a pulverizer or fan. The relationships between input, output, credits, and losses for a steam generator are illustrated in Figure A-1.

KVB's experience has shown the heat-loss efficiency determination method to be the most reliable when working with industrial boilers. Accurate fuel input measurements are rarely possible on industrial boilers due to the lack of adequate instrumentation, thus making the input-output method undesirable. The accuracy of the efficiency based on the heat loss method is determined primarily by the accuracy of the flue gas temperature measurement immediately following the last heat removal station, the stack gas excess O_2 level, the fuel analysis, the ambient temperature, and proper identification of the combustion device external surfaces (for radiation losses). Determination of the radiation and other associated losses may appear to be a rather imposing calculation, but in practice it can be accomplished by utilizing standard efficiency calculation procedures. Inaccuracies in determining efficiency occasionally occur even with the heat


HEAT IN FUEL (H_f) (CHEMICAL)
INPUT
B_A HEAT IN ENTERING AIR
B_z HEAT IN ATOMIZING STEAM
B_f SENSIBLE HEAT IN FUEL
B_x PULVERIZER OR CRUSHER POWER
B_x BOILER CIRCULATING PUMP POWER
B_x PRIMARY AIR FAN POWER
B_x RECIRCULATING GAS FAN POWER
B_mA HEAT SUPPLIED BY MOISTURE IN ENTERING AIR
B_w HEAT IN COOLING WATER
+ CREDITS (B)
ENVELOPE BOUNDARY
HEAT IN PRIMARY STEAM
HEAT IN DESUPERHEATER WATER AND CIRCULATING PUMP INJECTION WATER
HEAT IN FEEDWATER
HEAT IN BLOWDOWN AND CIRCULATING PUMP LEAK-OFF WATER
HEAT IN STEAM FOR MISCELLANEOUS USES
HEAT IN REHEAT STEAM OUT
HEAT IN DESUPERHEATER WATER
HEAT IN REHEAT STEAM IN
LOSSES (L)
L_UC UNBURNED CARBON IN REFUSE
L_G HEAT IN DRY GAS
L_mf MOISTURE IN FUEL
L_H MOISTURE FROM BURNING HYDROGEN
L_mA MOISTURE IN AIR
L_z HEAT IN ATOMIZING STEAM
L_CO CARBON MONOXIDE
L_UH UNBURNED HYDROGEN
L_UHC UNBURNED HYDROCARBONS
L_β RADIATION AND CONVECTION
L_p RADIATION TO ASH PIT, SENSIBLE HEAT IN SLAG & LATENT HEAT OF FUSION OF SLAG
L_d SENSIBLE HEAT IN FLUE DUST
L_r HEAT IN PULVERIZER REJECTS
L_w HEAT IN COOLING WATER
L_x SOOT BLOWING

OUTPUT = INPUT − LOSSES

DEFINITION: EFFICIENCY (PERCENT) = $\eta_g (\%) = \frac{\text{OUTPUT}}{\text{INPUT}} \times 100 = \frac{\text{INPUT} - L}{H_f + B} \times 100$

HEAT BALANCE: $H_f + B = \text{OUTPUT} + L$ OR $\eta_g (\%) = \left[1 - \frac{L}{H_f + B}\right] \times 100$

Figure A-1. Heat balance of steam generator.

loss method primarily because of out-of-calibration unit instrumentation such as the stack gas exit temperature. However, this problem has been resolved by KVB test engineers through the use of portable instrumentation and separate temperature readings.

The abbreviated efficiency test procedure which considers only the major losses and the chemical heat in the fuel as input will be followed. Tables A-1 and A-2 are the ASME Test Forms for Abbreviated Efficiency Tests on steam generators which exemplify the type of forms to be used for recording the necessary data and performing the required calculations.

KVB has developed a program for the HP-67 calculator which will provide the heat loss efficiency from the stack data. Figure A-2 shows the HP-67 keyed calculation sheet for calculating efficiency by the ASME Heat Loss Method.

TABLE A-1

ASME TEST FORM
FOR ABBREVIATED EFFICIENCY TEST

SUMMARY SHEET

PTC 4.1-a (1964)

		TEST NO.	BOILER NO.	DATE
OWNER OF PLANT		LOCATION		
TEST CONDUCTED BY		OBJECTIVE OF TEST		DURATION
BOILER MAKE & TYPE			RATED CAPACITY	
STOKER TYPE & SIZE				
PULVERIZER, TYPE & SIZE			BURNER, TYPE & SIZE	
FUEL USED	MINE	COUNTY	STATE	SIZE AS FIRED

PRESSURES & TEMPERATURES

1	STEAM PRESSURE IN BOILER DRUM	psia	
2	STEAM PRESSURE AT S. H. OUTLET	psia	
3	STEAM PRESSURE AT R. H. INLET	psia	
4	STEAM PRESSURE AT R. H. OUTLET	psia	
5	STEAM TEMPERATURE AT S. H. OUTLET	F	
6	STEAM TEMPERATURE AT R H INLET	F	
7	STEAM TEMPERATURE AT R. H. OUTLET	F	
8	WATER TEMP. ENTERING (ECON.)(BOILER)	F	
9	STEAM QUALITY % MOISTURE OR P. P. M.		
10	AIR TEMP. AROUND BOILER (AMBIENT)	F	
11	TEMP AIR FOR COMBUSTION (This is Reference Temperature) †	F	
12	TEMPERATURE OF FUEL	F	
13	GAS TEMP. LEAVING (Boiler) (Econ.) (Air Htr.)	F	
14	GAS TEMP. ENTERING AH (If conditions to be corrected to guarantee)	F	

UNIT QUANTITIES

15	ENTHALPY OF SAT. LIQUID (TOTAL HEAT)	Btu/lb	
16	ENTHALPY OF (SATURATED) (SUPERHEATED) STM.	Btu/lb	
17	ENTHALPY OF SAT. FEED TO (BOILER) (ECON.)	Btu/lb	
18	ENTHALPY OF REHEATED STEAM R. H. INLET	Btu/lb	
19	ENTHALPY OF REHEATED STEAM R. H. OUTLET	Btu/lb	
20	HEAT ABS/LB OF STEAM (ITEM 16 – ITEM 17)	Btu/lb	
21	HEAT ABS/LB R.H. STEAM (ITEM 19 – ITEM 18)	Btu/lb	
22	DRY REFUSE (ASH PIT + FLY ASH) PER LB AS FIRED FUEL	lb/lb	
23	Btu PER LB IN REFUSE (WEIGHTED AVERAGE)	Btu/lb	
24	CARBON BURNED PER LB AS FIRED FUEL	lb/lb	
25	DRY GAS PER LB AS FIRED FUEL BURNED	lb/lb	

HOURLY QUANTITIES

26	ACTUAL WATER EVAPORATED	lb/hr	
27	REHEAT STEAM FLOW	lb/hr	
28	RATE OF FUEL FIRING (AS FIRED wt)	lb/hr	
29	TOTAL HEAT INPUT $\frac{(\text{Item 28} \times \text{Item 41})}{1000}$	kB/hr	
30	HEAT OUTPUT IN BLOW-DOWN WATER	kB/hr	
31	TOTAL HEAT OUTPUT $\frac{(\text{Item 26} \times \text{Item 20}) + (\text{Item 27} \times \text{Item 21}) + \text{Item 30}}{1000}$	kB/hr	

FLUE GAS ANAL. (BOILER)(ECON) (AIR HTR) OUTLET

32	CO_2	% VOL	
33	O_2	% VOL	
34	CO	% VOL	
35	N_2 (BY DIFFERENCE)	% VOL	
36	EXCESS AIR	%	

FUEL DATA

	COAL AS FIRED PROX. ANALYSIS	% wt		OIL	
37	MOISTURE		51	FLASH POINT F*	
38	VOL MATTER		52	Sp. Gravity Deg. API*	
39	FIXED CARBON		53	VISCOSITY AT SSU* BURNER SSF	
40	ASH		44	TOTAL HYDROGEN % wt	
	TOTAL		41	Btu per lb	
41	Btu per lb AS FIRED				
42	ASH SOFT TEMP.* ASTM METHOD			GAS	% VOL
	COAL OR OIL AS FIRED ULTIMATE ANALYSIS		54	CO	
43	CARBON		55	CH_4 METHANE	
44	HYDROGEN		56	C_2H_2 ACETYLENE	
45	OXYGEN		57	C_2H_4 ETHYLENE	
46	NITROGEN		58	C_2H_6 ETHANE	
47	SULPHUR		59	H_2S	
40	ASH		60	CO_2	
37	MOISTURE		61	H_2 HYDROGEN	
	TOTAL			TOTAL	
	COAL PULVERIZATION			TOTAL HYDROGEN % wt	
48	GRINDABILITY INDEX*		62	DENSITY 68 F ATM. PRESS.	
49	FINENESS % THRU 50 M*		63	Btu PER CU FT	
50	FINENESS % THRU 200 M*		41	Btu PER LB	

64	INPUT-OUTPUT EFFICIENCY OF UNIT %	$\frac{\text{ITEM 31} \times 100}{\text{ITEM 29}}$

	HEAT LOSS EFFICIENCY	Btu/lb A. F. FUEL	% of A. FUEL
65	HEAT LOSS DUE TO DRY GAS		
66	HEAT LOSS DUE TO MOISTURE IN FUEL		
67	HEAT LOSS DUE TO H_2O FROM COMB. OF H_2		
68	HEAT LOSS DUE TO COMBUST. IN REFUSE		
69	HEAT LOSS DUE TO RADIATION		
70	UNMEASURED LOSSES		
71	TOTAL		
72	EFFICIENCY = (100 – Item 71)		

* Not Required for Efficiency Testing

† For Point of Measurement See Par. 7.2.8.1-PTC 4.1-1964

TABLE A-2

PTC 4.1-b (1964)

ASME TEST FORM

CALCULATION SHEET

FOR ABBREVIATED EFFICIENCY TEST

Revised September, 1965

	OWNER OF PLANT TEST NO. BOILER NO. DATE			
30	HEAT OUTPUT IN BOILER BLOW-DOWN WATER = LB OF WATER BLOW-DOWN PER HR × $\left[\dfrac{\overset{\text{ITEM 15}}{\dots\dots} - \overset{\text{ITEM 17}}{\dots\dots}}{1000}\right] = \overset{\text{kB/hr}}{\dots\dots}$			
24	*If impractical to weigh refuse, this item can be estimated as follows* DRY REFUSE PER LB OF AS FIRED FUEL = $\dfrac{\text{\% ASH IN AS FIRED COAL}}{100 - \text{\% COMB. IN REFUSE SAMPLE}}$ CARBON BURNED PER LB AS FIRED FUEL = $\dfrac{\overset{\text{ITEM 43}}{\dots\dots}}{100} - \left[\dfrac{\overset{\text{ITEM 22}}{\dots\dots} \times \overset{\text{ITEM 23}}{\dots\dots}}{14{,}500}\right] = \dots\dots$ NOTE: IF FLUE DUST & ASH PIT REFUSE DIFFER MATERIALLY IN COMBUSTIBLE CONTENT, THEY SHOULD BE ESTIMATED SEPARATELY. SEE SECTION 7, COMPUTATIONS.			
25	DRY GAS PER LB AS FIRED FUEL BURNED = $\dfrac{11CO_2 + 8O_2 + 7(N_2 + CO)}{3(CO_2 + CO)} \times (\text{LB CARBON BURNED PER LB AS FIRED FUEL} + \frac{3}{8}S)$ $= \dfrac{11 \times \overset{\text{ITEM 32}}{\dots\dots} + 8 \times \overset{\text{ITEM 33}}{\dots\dots} + 7\left(\overset{\text{ITEM 35}}{\dots\dots} + \overset{\text{ITEM 34}}{\dots\dots}\right)}{3 \times \left(\overset{\text{ITEM 32}}{\dots\dots} + \overset{\text{ITEM 34}}{\dots\dots}\right)} \times \left[\overset{\text{ITEM 24}}{\dots\dots} + \dfrac{\overset{\text{ITEM 47}}{\dots\dots}}{267}\right] = \dots\dots$			
36	EXCESS AIR† $= 100 \times \dfrac{O_2 - \frac{CO}{2}}{.2682N_2 - (O_2 - \frac{CO}{2})} = 100 \times \dfrac{\text{ITEM 33} - \frac{\text{ITEM 34}}{2}}{.2682\ (\text{ITEM 35}) - (\text{ITEM 33} - \frac{\text{ITEM 34}}{2})} = \dots\dots$			
	HEAT LOSS EFFICIENCY	Btu/lb AS FIRED FUEL	$\frac{\text{LOSS}}{\text{HHV}} \times 100 =$	LOSS %
65	HEAT LOSS DUE TO DRY GAS = $\text{LB DRY GAS PER LB AS FIRED FUEL} \times C_p \times (t_{lvg} - t_{air}) = \overset{\text{ITEM 25}}{\dots\dots} \times 0.24\ \overset{\text{(ITEM 13)}}{\dots\dots} - \overset{\text{(ITEM 11)}}{\dots\dots} = \dots\dots$ (Unit)	......	$\frac{65}{41} \times 100 =$	......
66	HEAT LOSS DUE TO MOISTURE IN FUEL = LB H_2O PER LB AS FIRED FUEL × [(ENTHALPY OF VAPOR AT 1 PSIA & T GAS LVG) − (ENTHALPY OF LIQUID AT T AIR)] = $\frac{\text{ITEM 37}}{100}$ × [(ENTHALPY OF VAPOR AT 1 PSIA & T ITEM 13) − (ENTHALPY OF LIQUID AT T ITEM 11)] = ...	......	$\frac{66}{41} \times 100 =$	......
67	HEAT LOSS DUE TO H_2O FROM COMB. OF H_2 = $9H_2$ × [(ENTHALPY OF VAPOR AT 1 PSIA & T GAS LVG) − (ENTHALPY OF LIQUID AT T AIR)] = 9 × $\frac{\text{ITEM 44}}{100}$ × [(ENTHALPY OF VAPOR AT 1 PSIA & T ITEM 13) − (ENTHALPY OF LIQUID AT T ITEM 11)] = ...	......	$\frac{67}{41} \times 100 =$	......
68	HEAT LOSS DUE TO COMBUSTIBLE IN REFUSE = $\overset{\text{ITEM 22}}{\dots\dots} \times \overset{\text{ITEM 23}}{\dots\dots} = \dots\dots$	......	$\frac{68}{41} \times 100 =$	......
69	HEAT LOSS DUE TO RADIATION* = $\dfrac{\text{TOTAL BTU RADIATION LOSS PER HR}}{\text{LB AS FIRED FUEL} - \underset{\dots\dots\dots}{\text{ITEM 28}}}$	......	$\frac{69}{41} \times 100 =$	......
70	UNMEASURED LOSSES **	......	$\frac{70}{41} \times 100 =$	......
71	TOTAL	......	......	......
72	EFFICIENCY = (100 − ITEM 71)	......	......	......

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† For rigorous determination of excess air see Appendix 9.2 – PTC 4.1-1964

* If losses are not measured, use ABMA Standard Radiation Loss Chart, Fig. 8, PTC 4.1-1964

** Unmeasured losses listed in PTC 4.1 but not tabulated above may by provided for by assigning a mutually agreed upon value for Item 70.

FIGURE A-2

HP-67 KEYED CALCULATION SHEET

ASME ABBREVIATED EFFICIENCY CALCULATION - HEAT LOSS METHOD

Test No.__________ Date__________ Location____________________ Unit No.__________ Fuel__________

(Turn Calculator Off and Then On. Load Program Card.)

A. FROM FUEL ANALYSIS:

Wt. % in as-fired fuel: C __________% (A1: (STO 0)), Moisture __________% (A2: (STO 1)), H __________% (A3: (STO 2)), S __________% (A4: (STO 3))

High heating value of fuel as-fired __________Btu/lb (A5: (STO 4))

B. FROM FLUE GAS ANALYSIS:

Volume % in flue gas of: O_2 __________% (B1: (STO 5)), CO_2 __________% (B2: (STO 6)), CO __________% (B3: (STO 7))

C. FROM REFUSE (FLY ASH AND ASH PIT) ANALYSIS:

C1. Fraction of dry refuse in fuel __________lbs dry refuse/lb as-fired fuel (STO 8)

C2. Heating value of dry refuse (weighted average) __________Btu/lb dry refuse (STO 9)

C3. Wt. % of combustibles in refuse __________% $(f\ P \gtrless S)$ (STO 4) $(f\ P \gtrless S)$

D. MEASURED TEMPERATURES

D1. Gas temp. leaving boiler, econ. or air heater __________°F (STO A)

D2. Comb. air temp. __________°F (STO B)

E. FROM STEAM TABLES:

E1. Enthalpy: $H_2O(g)$ at temp. D1 & 1 psia __________Btu/lb (STO C)

E2. Enthalpy: $H_2O(l)$ at comb. air temp. __________Btu/lb (STO D)

F. FROM ABMA STANDARD RADIATION LOSS CHART (UNLESS MEASURED):

F1. Heat loss due to radiation __________% of gross heat input (STO E)

G. FROM UNIT SPECIFICATIONS (if available, otherwise enter 0):

G1. Unmeasured losses __________% of gross heat input $(f\ P \gtrless S)$ (STO 0) $(f\ P \gtrless S)$

---

1. Excess Air $\approx \frac{100\ (2B1 - B3)}{0.5364(100 - B1 - B2) - (2B1 - B3)}$ (A)__________%

2. (Optional) Pounds dry gas per pound of fuel =

$$\frac{B1 + 4B2 + 700}{3(B2 + B3)} \times \left[\frac{A1}{100} - \frac{C1 \times C2}{14500\left(1 - \frac{C3}{100}\right)} + \frac{3A4}{800}\right]$$

(R/S)__________lbs dry gas/lb as-fired fuel

Heat Losses	% of Gross Heat Input	(Optional) Btu/lb as-fired fuel*
3. Due to dry gas = $\frac{24 \times EQ.2 \times (D1 - D2)}{A5}$	(B)__________	(R/S)__________
4. Due to moisture in fuel = $\frac{A2 \times (E1 - E2)}{A5}$	(C)__________	(R/S)__________
5. Due to H_2O from combustion of H_2 = $\frac{9 \times A3(E1 - E2)}{A5}$	(D)__________	(R/S)__________
6. Due to combustibles in refuse = $\frac{100 \times C1 \times C2}{A5}$	(E)__________	(R/S)__________
7. Total Losses = Sum of calculated losses + F1 + G1	(f a)__________	(R/S)__________
8. Efficiency = 100 - Total Losses	(f b)__________	

---

*Calculated as percent of gross heat input x A5 ÷ 100

KVB 6015-21 (Rev 1)
11/7/78

APPENDIX B

DATA RECORDING FORMATS

DOCUMENTATION OF RESULTS

Field Measurements

During testing, two sets of measurements are recorded: 1) control room data which indicate the operating condition of the device and 2) emissions data that are the readouts of the individual analyzers.

The concentration of nitric oxide (NO), carbon dioxide (CO_2), carbon monoxide (CO), and oxygen (O_2) are measured and recorded. The concentration of these species are measured and displayed continuously by analyzers and strip chart recorders mounted in a console. The strip chart recordings are retained for future reference. Opacity, particulate loading, and POM concentration are measured at the sampling port and the measurements recorded on data sheets.

A number of data sheets have been developed for use in field measurements. These data sheets are listed below together with their purpose. An example of each sheet follows.

Figure No.	Title	Purpose
B-1	Thirty-Day Field Test Data Sheets	Record control room data
B-2	Gaseous Emissions Data	Record Gaseous Emissions Analyzer data
B-3	Nozzle Size, Q_m and ΔH Calculations	Calculate nozzle size, flow rate, and ΔH for Method 5 Test
B-4	Response Time for Continuous Instruments	Continuous monitor certification
B-5	Zero and Calibration Drift (24 hr)	Continuous monitor certification
B-6	Zero and Calibration Drift (2 hr)	Continuous monitor certification
B-7	Accuracy Determination (NOx)	Continuous monitor certification
B-8	Calibration Error Determination	Continuous monitor certification

Figure No.	Title	Purpose
B-9	Analysis of Calibration Gas Mixture	Continuous monitor certification
B-10	Particulate Calculation Sheet	Calculate weight of solid particulate catch
B-11	Stack Data	Record volumes, temperatures, pressures of Method 5 control unit.
B-12	Particulate Emission Caculations	Calculate particulate emision factors
B-13	Velocity Traverse	Record temperature and velocity profile of stack
B-14	Liquid or Solid Fuel Calculation	Calculate stoichiometric properties of fuel

Figure B-1.

KVB, Inc.

THIRTY DAY FIELD TEST DATA SHEET

Site_______________ Fuel_______________

Test No.						
Date						
Time						
Load						
Test Description						
Windbox, in. H_2O						
Furnace, in. H_2O						
Overfire air, in. H_2O						
Boiler exit, in. H_2O						
Economizer exit, in. H_2O						
ID fan inlet, in. H_2O						
Steam flow, kpph						
Integrated steam flow Time/ k lbs						
Air flow indic.						
Superheater outlet temp. °F						
Flue gas temp, economizer inlet, °F						
Flue gas temp, economizer outlet, °F						
Temp F.W. economizer outlet, °F						
Feed Water Control, %						
Temp F.W. heater, °F						
F.W. economizer inlet, °F						
Steam pressure, psig						
Fuel feed						
Overfire air damper						
F.D. fan						
F.D. fan damper						
I.D. fan						
I.D. fan damper						

(continued)

Data Sheet 6017-26
12/12/78
KVB 6017-859

Figure B-1. (Continued)

THIRTY DAY FIELD TEST DATA SHEET

Page 2

Test No.			
Smoke Indicator Chart			
Rotary speed			
Spill plate setting			
Grate speed			
Overfire air damper, % open			
Fuel flow, Time/lbs			
Flame observations			
Bed thickness			
General furnace appearance			
Clinkers			
Ambient air temp, °F & F.D. fan inlet temp.			

Comments:

Figure B-2.

KVB, INC.

GASEOUS EMISSIONS DATA

Date__________

Engr.__________

Low NO_x Control Method__________

Unit No.__________ Location__________

Fuel__________ Capacity__________

Unit Type__________ Burner Type__________

1. Test No.										
2. Time										
3. Load										
4. Process Rate										
5. Flue Diam. or Size, ft										
6. Probe Position										
7. Oxygen (%)										
8. NO_x (hot) read/3% O_2 (ppm)										
9. NO (hot) read/3% O_2 (ppm)										
10. NO_2 (hot) read/3% O_2 (ppm)										
11. Carbon Dioxide (%)										
12. Carbon Monoxide (ppm) uncor/cor										
13. Opacity										
14. Atmos. Temp. (°F/°C)										
15. Dew Point Temp. (°F/°C)										
16. Atmos. Pressure (in. Hg)										
17. Relative Humidity (%)										

Data Sheet
6015-23
9/29/78
KVB 6017-859

Figure B-3.

HP-67 Keyed Calculation Sheet
NOZZLE SIZE, Q_m and ΔH CALCULATIONS

Test No. ____________ Date ____________ Location ____________

Unit No. ____________ Fuel ____________ Sampling Method ____________

Crew: Engr. ____________ Techs. ____________

DATA

Constants		Key	Actual Conditions		Key
Pitot Factor, F_s		(STO 1)	Meter Temperature, T_m(°F)		(STO 5)
Orifice Factor, J		(STO 2)	Barom. Press., P_{Bar} (in. Hg)		(STO 6)
Orifice Diam., D_o (in.)		(STO 3)	Static Press. Diff., ΔP_s (iwg)		(STO 7)
Ideal Meter Flow, Q_n (ACFM)		(STO 4)	Nozzle Temp., T_n (°F)		(STO 8)
			Stack Vel. Press., Δp (iwg)		(STO 9)

NOTE: TO RECALCULATE IDEAL NOZZLE SIZE, RESTORE DATA IN REGISTERS 4 THRU 8, CLEAR STACK AND RE-ENTER % H_2O, % O_2, and % CO_2

Gaseous Stack Composition

% H_2O	(%)		ENTER
% O_2 dry	(%)		ENTER
% CO_2 dry	(%)		

IDEAL NOZZLE CALCULATION

(A) Ideal Nozzle Size, $D_{n(Ideal)}$ ________ inches

METER FLOW RATE AND ORIFICE PRESS. DIFF. CALCULATIONS

Actual Nozzle Size, $D_{n(Actual)}$ ________ inches

(C) Actual Meter Flow Rate, $Q_{m(Actual)}$ ________ ACFM (on meter)

(RCL 7) Orifice Press. Diff., ΔH to obtain $Q_{m(Actual)}$ ________ iwg

NOTE: To Determine Q_m and ΔH for Other Actual Nozzle Size, Key in $D_{n(Actual)}$, Press C for Q_m, then RCL 7 for ΔH.

For one $D_{n(Actual)}$ with Changing Stack Velocity Pressure (Δp) and Nozzle Temperature (T_n)
(It is not necessary to restore data in registers 4-8 for these calculations)

Δp (ENTER) (iwg)	T_n (°F)	(E) Q_m (ACFM)	(R/S) $\Delta H'$ (iwg)

EQUATIONS

(1) $M_d = 1/25\ (4\ \%\ CO_2 + \%\ O_2) + 28$ (lb/lb mole) (2) $M_s = M_d\left(\frac{\%\ H_2O - 100}{-100}\right) + \frac{18}{100}(\%\ H_2O)$ (lb/lb mole)

(3) $P_s = 13.6\ P_{Bar} + \Delta P_s$ (in. of water) (4) $V_n = 10093\ F_s\sqrt{[\Delta p\ (T_n + 460)]/P_s\ M_s}$ (ft/min)

$$(5)\quad Q_m = \frac{Q_{n(Ideal)}\ (T_n + 460)\ 13.6\ P_{Bar}\ [828475\ F_s^2 J^2 D_o^4\ (T_m + 460)]}{[1 - (\%\ H_2O/100)](T_n + 460)\ P_s[828475\ F_s^2 J^2 D_o^4\ (T_m + 460) - 768\ M_d\ Q^2_{m(Ideal)}]} \quad \text{(ACFM)}$$

(6) $D_{n(Ideal)} = \sqrt{183.35\ (Q_n/V_n)}$ (in.) (7) $Q_{n(Actual)} = [V_n\ D^2_{n(Actual)}]/183.35$ (ACFM)

$$(8)\quad Q_{m_i} = \frac{Q_{n(Actual)}\ (T_m + 460)(1 - \%\ H_2O/100)(13.6\ P_{Bar} + \Delta P_s)}{(T_n + 460)(13.6\ P_{Bar} + \Delta H_{i-1})} \quad \text{assume } \Delta H_o = \Delta P_s \quad \text{(ACFM)}$$

$i = 1,n$ where n = number of iterations to obtain ΔH_i s.t. $\frac{(\Delta H_{i-1} - \Delta H_i)}{\Delta H_{i-1}} \leq 0.001$

$$(9)\quad \Delta H_i = \frac{760\ Q_{m_i}^2\ M_d\ 13.6\ P_{Bar}}{828475\ F_s^2 J^2 D_o^4\ (T_m + 460) - 760\ Q_{m_i}^2\ M_d} \quad \text{(in. of water)}$$

Figure B-4.

KVB

Engineer ____________

MONITOR PERFORMANCE TEST DATA SHEET

RESPONSE TIME FOR CONTINUOUS INSTRUMENTS

Date of Test ____________

Span Gas Concentration __________ppm

Analyzer Span Setting __________ppm

	1	_________seconds
Upscale	2	_________seconds
	3	_________seconds

Average upscale response ________seconds

	1	_________seconds
Downscale	2	_________seconds
	3	_________seconds

Average downscale response ________seconds.

System average response time (slower time) = __________seconds.

% deviation from slower system average response $= \left[\frac{\text{average upscale minus average downscale}}{\text{slower time}}\right] \times 100\% =$ ____.

Data Sheet 6017-35
40CFR60/App. B
7/1/77
KVB 6017-859

Figure B-5.

KVB

Engineer_____________

MONITOR PERFORMANCE TEST DATA SHEET

ZERO AND CALIBRATION DRIFT (24-HOUR)

Date and Time	Zero Reading	Zero Drift (ΔZero)	Span Reading (After Zero Adjustment)	Calibration Drift (ΔSpan)

Zero Drift = [Mean Zero Drift* _______ + C.I. (Zero) _______]
÷ [Instrument Span] x 100 = _______.

Calibration Drift = [Mean Span Drift* _______ + C.I. (Span) _______]
÷ [Instrument Span] x 100 = _______.

*Absolute Value

Data Sheet 6017-34
40CFR60/App. B
7/1/77

Figure B-6.

KVB

MONITOR PERFORMANCE TEST DATA SHEET

ZERO AND CALIBRATION DRIFT (2 HOUR)

Engineer_______________

Data Set No.	Time		Date	Zero Reading	Zero Drift (ΔZero)	Span Reading	Span Drift (ΔSpan)	Calibration Drift (Span-Zero)
	Begin	End						
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

Zero Drift = [Mean Zero Drift* ________ + CI (Zero) ________] ÷ [Span] x 100 = ________.

Calibration Drift = [Mean Span Drift* ________ + CI (Span) ________] ÷ [Span] x 100 = ________.

*Absolute Value.

Data Sheet 6017-33
40CFR60/App. B
7/1/77

Figure B-7.

KVB

MONITOR PERFORMANCE TEST DATA SHEET

ACCURACY DETERMINATION (NO_x)

Engineer ______________

Test No.	Date and Time	Reference Method Samples				Analyzer 1-Hour Average (ppm)* NO_x		Difference (ppm) NO_x	
		NO_x Sample 1 (ppm)	NO_x Sample 2 (ppm)	NO_x Sample 3 (ppm)	NO_x Sample Average (ppm)				
1									
2									
3									
4									
5									
6									
7									
8									
9									

Mean reference method test value (NO_x) ______________

Mean of the differences ______________

95% Confidence intervals = ± ______________ ppm (NO_x)

Accuracies = $\frac{\text{Mean of the differences + 95\% confidence interval}}{\text{Mean reference method value}}$ x 100 = ______________ % (NO_x)

* Explain and report method used to determine integrated averages

Data Sheet 6017-32

40CFR60/App. B
7/1/77

Figure B-8.

KVB

Engineer______________

MONITOR PERFORMANCE TEST DATA SHEET

CALIBRATION ERROR DETERMINATION

Calibration Gas Mixture Data

Mid (50%) _____ppm High (90%) _____ppm

Run #	Calibration Gas Concentration, ppm	Measurement System Reading, ppm	Differences[1], ppm
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

	Mid	High
Mean difference	_____	_____
Confidence interval	+ _____	+ _____
Calibration error = $\frac{\text{Mean Difference}^{2} + \text{C.I.}}{\text{Average Calibration Gas Concentration}} \times 100$	_____%	_____%

---

[1] Calibration gas concentration - measurement system reading

[2] Absolute value

Data Sheet 6017-31
40CFR60/App. B
7/1/77
KVB 6017-859

Figure B-9.

KVB

Engineer____________

MONITOR PERFORMANCE TEST DATA SHEET

ANALYSIS OF CALIBRATION GAS MIXTURES

Date:____________ Reference Method Used:______

Mid-Range Calibration Gas Mixture

Sample 1 ____________ppm

Sample 2 ____________ppm

Sample 3 ____________ppm

Average ____________ppm

High-Range (span) Calibration Gas Mixture

Sample 1 ____________ppm

Sample 2 ____________ppm

Sample 3 ____________ppm

Average ____________ppm

Data Sheet 6017-30
40CFR60/App. B
7/1/77

Figure B-10.

PARTICULATE CALCULATION SHEET

Test Crew____________

Test No.__________ Date__________ Location____________

Box No.__________ Sample Probe Position____________

Test Description

Dry Gas Meter Vol. (ft^3)

Final ________

Initial ________

Total ________

Impinger Water Vol (ml)

	1	2	3	S. Gel	Total
Final					
Initial					
Δ Vol					

Beaker No.					Filter No.	Blank No.
Date Weighed						
Tare Wt. 1						
2						
3						
4						
5						
6						
Avg						
Bottle No.						
Content Impinger (Water)	Probe (Acetone)	Probe (Water)	Cyclone (Acetone)	Flask (Dry)		
Rinse (ml)						
Date Weighed or 250 Bake						
Final Wt. 250 1						
2						
3						
4						
5						
6						
Avg						
Residue wt Final 250-Tare						
Date Weighed or 650 Bake						
Final Wt. 650 1						
2						
3						
4						
5						
6						
Avg						
Residue Wt Final 650-Tare						

Comments:

Data Sheet 6002-3

Figure B-11.

K V B. INC.

STACK DATA

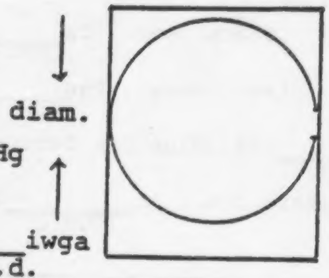
Test No._____
Engr._______

Date__________ Location_________ Unit No.__________ Fuel___________

Load__________ K#/hr or MBtu/hr Filter No._______

Sample Box No._____ Meter Box No._____ Probe No.____ Probe Length____

Filter Heater Setting _____
Probe Heater Setting _____
Stack Moisture _____ %
Ambient Temperature _____ °F
Nozzle Diameter _____ in.
Atmospheric Pressure _____ in.Hg
Weather ___________________________
Stack Gas Pressure, Ps _____ iwg
Abs. Stack Press., AP=P_s+407=____ iwga
Stack Gas Sp. Gravity, Gs____ n.d.
Stack Area, As _________ ft^2



Remarks
Final Meter: ________________
Initial Meter: _______________
____
____

Time	Vm Meter Volume Reading (CF)	Vacuum Gage Reading (iwg)	ΔP Pitot Tube Pressure (iwg)	H Orfice Pressure Diff (°F)	Stack Temp. (°F)	Impinger Temperature Out (°F)	Impinger Temperature In (°F)	Filter Box Temp. (°F)	Meter Temp. (°F)
Total					°F				
Avg.					°F				
					+ 460				

Ts= ______ °R

HP-67 KEYED CALCULATION SHEET*

Figure B-12.

PARTICULATE EMISSION CALCULATIONS

Test No.__________ Date__________ Location____________________ Engr.__________

Unit No.__________ Fuel__________ Sampling Train and Method ____________________

Pitot Factor, Fs .83 Barometric Pressure, P_{bar}__________ (STO 0) in. Hg

Tot. Liquid Collected, V_{1c}__________ (STO 1) ml Total Particulate, M_n__________ (STO 2) m gm

Velocity Head, ΔP__________ (STO 3) iwg Stack Temp., Ts__________ (STO 4) °F Stack Area, As__________ (STO 5) ft^2

Sample Volume, Vm__________ (STO 6) ft^3 Stack Press., Psg__________ (STO 7) iwg Excess O_2, XO_2%__________ (STO 8) %

Orifice Press. Diff., H__________ (STO 9) iwg, (Flue Gas Density/Air Density) @ T_s, Gs__________ (STO A) n.d.

Sample Time, θ__________ (STO B) min Nozzle Dia., Dn__________ (STO C) in. Meter Temp., T_m__________ (STO D) °F

Select Fe	Oil (A)	Gas (B)	Coal (C)	Other:
SC Feet/10^4 Btu	92.2	87.4	98.2	(D)

Press (E) if meter is not temperature compensated.

1. Sample Gas Volume $Vm_{std} = 0.0334\ Vm(P_{bar} + H/13.6)$ __________ SCF
2. Water Vapor $Vw_{std} = 0.0474\ V_{1c}$ __________ SCF
3. Moisture Content $Bwo = Eq.\ 2/(Eq.\ 1 + Eq.\ 2)$ __________ N.D.
4. Concentration a. $C = 0.0154\ Mn/Vm_{std}$ __________ grains/DSCF

   b. $C = 2.205 \times 10^{-6}\ Mn/Vm_{std}$ __________ lb/DSCF

   c. $C = Eq.\ 4b \times 16.018 \times 10^3$ __________ grams/DSCM
5. Abs. Stack Press. $Ps = P_{bar} \times 13.6 + Psg$ __________ in. w abs.
6. Stack Gas Speed $Vs = 174\ Fs\ \sqrt{\Delta P Ts}\ \sqrt{\frac{407}{Ps} \times \frac{1.00}{Gs}}$ __________ ft/min
7. Stack Gas Flow Rate @ 70°F a. $Qsw = Eq.\ 6 \times As \times \frac{530}{Ts} \times \frac{Ps}{407}$ __________ WSCF/min

   b. $Qsd = Eq.\ 7a \times (1. - Eq.\ 3)$ __________ DSCF/min
8. Material Flow $Ms = Eq.\ 7b \times Eq.\ 4b \times 60$ __________ lb/hr
9. XO_2 factor $XO_2f = 2090/(20.9 - XO_2\%)$ __________ N.D.
10. Emission a. $E = Eq.\ 4b \times Fe \times Eq.\ 9$ __________ lb/MMBtu

    b. $E = Eq.\ 4c \times Fm \times Eq.\ 9 \times 1000$ __________ ng/joule
11. % Isokinetic $I = \dfrac{14077 \times Ts(Vm_{std} + Vw_{std})}{\theta \times Vs \times Ps \times Dn^2}$ __________ %

*If calculating by hand:
1) Convert T_s and T_m to °R
2) Multiply EQ 1 by $530/T_m$(°R) if meter not temperature compensated.
3) $F_m = 2.684 \times 10^{-5} \times F_e$

Data Sheet 6002-4
Revised 9/27/78
KVB 6017-859

Figure B-13.

KVB, Inc.

VELOCITY TRAVERSE

oject:______________________ Test Description:___

Date:______________________ ______________________

Location:______________________ ______________________

Unit:______________________ ______________________

Test:______________________ Personnel:__________

Fuel:______________________ ______________________

Barometric Press. (in. Hg):______________________

Absolute Static Press. in Stack (in. Hg):__________ (P_s)

Pitot Tube Coefficient:______________________ (C_p)

$$V_S = 85.48\ C_p \left[\frac{T_S \Delta P}{P_S M_S}\right]^{1/2}$$

Stack Cross Section

Time	Traverse Point Port	Depth	Velocity Head (in. H_2O)	Gas Temp. (°F)	Gas Temp. (°R)	Molecular Wt.	Velocity (ft/sec)	O_2 Conc. (% Dry)
			ΔP		T_S	M_S	V_S	

Figure B-14.

KVB

Test No.__________ Date____________ Location______________________ Unit No.______

Fuel________________ Fuel Sample No.________________ Fuel Sample Point_______

LIQUID OR SOLID FUEL CALCULATIONS

(f)(CL REG), (f) ($P\overset{>}{<}S$), (f)(CL REG), Load data card, then PGRM card (both sides)

*Input HHV (Btu/lb) ____________, (A)
*Input wt % C ____________, (R/S)
*Input wt % H ____________, (R/S)
*Input wt % S ____________, (R/S)
*Input wt % O ____________, (R/S)
*Input wt % N ____________, (R/S) - decimal point blinks after pressing; item #1 displayed

1. Dry stoichiometric moles flue gas/lb fuel = ____________.
(One may proceed to items 9, 17, or 18 by pressing (f)(A), (E), or entering MW and pressing (B), respectively.)

*Input wt % H_2O in fuel (0 if none) ____________

(C) 2. Moles H_2O in flue gas/lb fuel ____________
(R/S) 3. Total moles of flue gas (stoichiometric)/lb fuel ____________
(R/S) 4. Dry volume/wet volume ____________
(R/S) 5. Volume % H_2O in flue gas ____________
(R/S) 6. Volume % CO_2, dry in flue gas ____________
(R/S) 7. SO_2 (ppm by vol.), dry at stoichiometric ____________
(R/S) 8. NO (ppm by vol.), dry at stoichiometric ____________

(f)(A) 9. Stoichiometric air/fuel ratio (lb air/lb fuel) ____________

(Before items 10-16 may be determined, items 1-9 must be completed.)
(D) → 20.95 displayed

*Input measured vol. % O_2 for O_2 correction ______ ______ ______ ______
(R/S) 10. $\frac{\text{Gas moles at } \% O_2}{\text{Gas moles, stoic.}} = \frac{20.95}{20.95 - \% O_2} =$ ______ ______ ______ ______
(R/S) 11. Dry moles flue gas/lb fuel at % O_2 ______ ______ ______ ______
(R/S) 12. Vol. % CO_2, dry at % O_2 ______ ______ ______ ______
(R/S) 13. SO_2 (ppm by vol.) dry at % O_2 ______ ______ ______ ______
(R/S) 14. NO (ppm by vol.) dry at % O_2 ______ ______ ______ ______
(R/S) 15. Vol. % H_2O at % O_2 ______ ______ ______ ______
(R/S) 16. Percent Excess Air ______ ______ ______ ______
(decimal pt. blinks)

(RCL)(2)(E) 17. Converts item 1 to SCF dry flue gas at stoich/10^6 Btu = ____________

Item 18.

a. *Input MW, (B), program calculates K (lb/10^6 Btu = ppm/K)
(MW = 46 for NOx, CO = 28, HC = 16, SOx = 64)
   1. *Input measured ppm at 3% O_2, dry, (R/S), program calculates lb/10^6 Btu.
   2. (Optional) No input, (R/S), program converts lb/10^6 Btu → ng/J
   3. Repeat steps (1) and (2) as necessary.

b. *Enter next value of MW, complete step (a) followed by steps (1), (2), and (3). Repeat for all species desired.

	MW	K for lb/10^6 Btu
NOx	46	________
CO	28	________
HC	16	________
SOx	64	________

---

*Indicates input is required

Data Sheet 6015-19
Revised 7/6/78

APPENDIX C

CONTINUOUS MONITOR CERTIFICATION DATA SHEETS

KVB

MONITOR PERFORMANCE TEST DATA SHEET

CALIBRATION ERROR DETERMINATION

JAN 1 1 1979

W. CARTER
H. BUENING

Calibration Gas Mixture Data

Mid (50%) 120 ppm High (90%) 234 ppm

NO Analyzer - TECO SERIES 10

Run #	Calibration Gas Concentration, ppm	Measurement System Reading, ppm	Differences[1], ppm
1 O	0	0	0
2 M	120	119	1
3 O	0	0	0
4 H	234	234	0
5 M	120	119	1
6 H	234	234	0
7 M	120	120	0
8 O	0	0	0
9 M	120	120	0
10 O	0	0	0
11 H	234	235	1
12 M	120	120	0
13 H	234	235	1
14 O	0	0	0
15 H	234	235	1

Reading on 0-250 ppm range.

	Mid	High
Mean difference	0.4	0.6
Confidence interval	+0.7	+0.7
$\text{Calibration error} = \frac{\text{Mean Difference}^{2} + \text{C.I.}}{\text{Average Calibration Gas Concentration}} \times 100$	0.9 %	0.6 %

---

[1] Calibration gas concentration - measurement system reading

[2] Absolute value

MONITOR PERFORMANCE TEST DATA SHEET

CALIBRATION ERROR DETERMINATION

JAN 11 1979
W. CARTER
H. BUENING

Calibration Gas Mixture Data

Mid (50%) 10.0 ~~ppm~~ %   High (90%) 17.8 % ~~ppm~~

CO_2 Analyzer - Horiba PIR-2000

Run #	Calibration Gas Concentration, ~~ppm~~ %	Measurement System Reading, ~~ppm~~ %	Differences[1], ppm
1	0	0	0
2	10 %	10.0 %	0
3	0	0	0
4	17.8	17.8	0
5	10.0	10.0	0
6	17.8	17.8	0
7	10.0	10.0	0
8	0	0	0
9	10.0	10.0	0
10	0	0	0
11	17.8	17.8	0
12	10.0	10.0	0
13	17.8	17.8	0
14	0	0	0
15	17.8	17.8	0

Reading on Range 3, 0-20%

	Mid	High
Mean difference	0	0
Confidence interval	+ 0	+ 0
Calibration error = $\frac{\text{Mean Difference}^{2} + \text{C.I.}}{\text{Average Calibration Gas Concentration}} \times 100$	0 %	0 %

---

[1] Calibration gas concentration - measurement system reading

[2] Absolute value

KVB

MONITOR PERFORMANCE TEST DATA SHEET

CALIBRATION ERROR DETERMINATION

JAN 11 1979

W. CARTER
H BUENING

Calibration Gas Mixture Data

Mid (50%) 500 ppm High (90%) 900 ppm

CO Analyzer - Horiba PIR - 2000

Run #		Calibration Gas Concentration, ppm	Measurement System Reading, ppm	Differences[1], ppm
1	O	0	0	0
2	M	500	490	10
3	O	0	0	0
4	H	900	900	0
5	M	500	491	9
6	H	900	900	0
7	M	500	492	8
8	O	0	0	0
9	M	500	491	9
10	O	0	0	0
11	H	900	900	0
12	M	500	491	9
13	H	900	900	0
14	O	0	0	0
15	H	900	900	0

Reading on Range 2 ; 0-1000 ppm

	Mid	High
Mean difference	9	0
Confidence interval	+.9	+ 0
Calibration error = $\frac{\text{Mean Difference}^2 + \text{C.I.}}{\text{Average Calibration Gas Concentration}} \times 100$	1.98 %	0 %

---

[1] Calibration gas concentration - measurement system reading

[2] Absolute value

KVB

MONITOR PERFORMANCE TEST DATA SHEET

CALIBRATION ERROR DETERMINATION

JAN 1 1 1979
W. CARTER
H. BUENING

Calibration Gas Mixture Data

Mid (50%) 5.0 ~~ppm~~ %   High (90%) 9.3 ~~ppm~~ %

Oxygen Analyzer — Beckman Model 7003

Run #	Calibration Gas Concentration, ~~ppm~~ %	Measurement System Reading, ~~ppm~~ %	Differences[1] ~~ppm~~ %
1	0	.1 %	-.1
2	5.0	5.0	0
3	0	.1	-.1
4	9.3	9.0	+.3
5	5.0	4.9	+.1
6	9.3	9.0	+.3
7	5.0	4.9	+.1
8	0	0	0
9	5.0	5.0	0
10	0	0	0
11	9.3	9.1	+.2
12	5.0	5.0	0
13	9.3	9.1	+.2
14	0	0	0
15	9.3	9.1	+.2

Reading on 0-10 scale

	Mid	High
Mean difference	0.04	0.24
Confidence interval	+.07	+.07
Calibration error = $\frac{\text{Mean Difference}^{2} + \text{C.I.}}{\text{Average Calibration Gas Concentration}} \times 100$	2.2 %	3.3 %

---

[1] Calibration gas concentration - measurement system reading

[2] Absolute value

NO MONITOR PERFORMANCE TEST DATA SHEET
ZERO AND CALIBRATION DRIFT (2 HOUR)

Data Set No.	Time		Date	Zero Reading	Zero Drift (ΔZero)	Span Reading	Span Drift (ΔSpan)	Calibration Drift (Span-Zero)
	Begin	End						
1	*1000*		*1-12-79*	*0*	*—*	*234*	*-*	*-*
2	*1200*			*4.7*	*4.7*	*236*	*+ 2*	*- 2.7*
3	*1400*			*3.6*	*- 1.1*	*231*	*- 5*	*-3.9*
4	*1600*			*6.6*	*+ 3.0*	*243*	*+ 12*	*+ 9.0*
5	*1800*			*9.7*	*+ 3.1*	*244*	*+ 1*	*- 2.1*
6	*2000*			*11.5*	*+ 1.8*	*249*	*+ 5*	*+ 3.2*
7	*2200*			*10.5*	*- 1.0*	*245*	*- 4*	*-3.0*
8	*2400*			*10.5*	*0*	*246*	*+ 1*	*1.0*
9	*1000*		*1-13-79*	*0*	*—*	*234*	*—*	*—*
10	*1200*			*6.7*	*6.7*	*234*	*0*	*-6.7*
11	*1400*			*6.7*	*0*	*234*	*0*	*0*
12	*1600*			*6.5*	*-.2*	*235*	*+ 1*	*+ 1.2*
13	*1800*			*5.4*	*- 1.1*	*235*	*0*	*1.1*
14	*2000*			*5.9*	*+ .5*	*235*	*0*	*-.5*
15	*2200*			*2.6*	*- 3.3*	*234*	*- 1*	*+ 2.3*
16	*2400*			*0*	*- 2.6*	*231*	*- 3*	*- .4*
17	*0200*		*1-14-79*	*0*	*0*	*227*	*- 4*	*- 4.0*
18								
19								
20								

Zero Drift = [Mean Zero Drift* *1.94* + CI (Zero) *1.07*] ÷ [Span] x 100 = *1.20%*.

Calibration Drift = [Mean Span Drift* *2.60* + CI (Span) *1.76*] ÷ [Span] x 100 = *1.74%*

*Absolute Value.

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CO$_2$ MONITOR PERFORMANCE TEST DATA SHEET
ZERO AND CALIBRATION DRIFT (2 HOUR)

Data Set No.	Time		Date	Zero Reading	Zero Drift (ΔZero)	Span Reading	Span Drift (ΔSpan)	Calibration Drift (Span-Zero)
	Begin	End						
1	1000		1-12-79	0	–	17.8%	–	—
2	1200		↓	0	0	17.8	0	0
3	1400			0	0	17.8	0	0
4	1600			0	0	17.9	+.1	+.1
5	1800			0	0	17.9	0	0
6	2000			0	0	18.0	+.1	+.1
7	2200			0	0	17.8	-.2	-.2
8	2400			-0.5	-.5	17.8	0	+.5
9	1000		1-13-79	0	—	17.8	—	—
10	1200		↓	0	0	17.8	0	0
11	1400			0	0	17.7	-.1	-.1
12	1600			0	0	17.8	+.1	+.1
13	1800			0	0	17.6	-.2	-.2
14	2000			0	0	17.6	0	0
15	2200			0	0	17.6	0	0
16	2400			+0.5	+.5	17.6	0	-.5
17	0200		1-14-79	0	-.5	17.7	+.1	+.6
18								
19								
20								

Zero Drift = [Mean Zero Drift* 0.10 + CI (Zero) 0.11] ÷ [Span] x 100 = 1.05%

Calibration Drift = [Mean Span Drift* ,06 + CI (Span) ,04] ÷ [Span] x 100 = 0.5%

*Absolute Value.

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CO MONITOR PERFORMANCE TEST DATA SHEET
ZERO AND CALIBRATION DRIFT (2 HOUR)

Data Set No.	Time		Date	Zero Reading	Zero Drift (ΔZero)	Span Reading	Span Drift (ΔSpan)	Calibration Drift (Span-Zero)
	Begin	End						
1	1000		1-12-79	0	-	900	—	—
2	1200			0	0	895	-5	-5
3	1400			-9	-9	892	-3	+6
4	1600			-10	-1	895	+3	+4
5	1800			-18	-8	890	-5	+3
6	2000			-18	0	890	0	0
7	2200			-10	+8	890	0	-8
8	2400			-10	0	842	+2	2
9	1000		1-13-79	0	—	900	—	—
10	1200			0	0	902	2	2
11	1400			0	0	902	0	0
12	1600			0	0	900	-2	-2
13	1800			-2	-2	900	0	+2
14	2000			0	+2	900	0	-2
15	2200			-5	-7	900	0	+7
16	2400			-5	0	903	+3	+3
17	0200		1-14-79	-5	0	905	+2	+2
18								
19								
20								

Zero Drift = [Mean Zero Drift* 2.47 + CI (Zero) 1.96] ÷ [Span] x 100 = 0.44%.

Calibration Drift = [Mean Span Drift* 1.80 + CI (Span) 0.98] ÷ [Span] x 100 = 0.28%.

*Absolute Value.

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O_2 MONITOR PERFORMANCE TEST DATA SHEET
ZERO AND CALIBRATION DRIFT (2 HOUR)

Data Set No.	Time		Date	Zero Reading	Zero Drift (ΔZero)	Span Reading	Span Drift (ΔSpan)	Calibration Drift (Span-Zero)
	Begin	End						
1	1000		1-12-79	DNA	DNA	9.27	—	
2	1200					9.10	-.17	.17
3	1400					9.20	+.10	.10
4	1600					9.10	-.10	.10
5	1800					9.0	-.10	.10
6	2000					9.0	0	0
7	2200					9.10	.10	.10
8	2400					9.0	.1	.10
9	1000		1-13-79			9.27	—	—
10	1200					9.27	0	0
11	1400					9.27	0	0
12	1600					9.25	-.02	.02
13	1800					9.27	+.02	.02
14	2000					9.30	+.03	.03
15	2200					9.25	-.05	.05
16	2400					9.25	0	0
17	0200		1-14-79			9.27	+.02	.02
18								
19								
20								

Zero Drift = [Mean Zero Drift* ________ + CI (Zero) ________] ÷ [Span] x 100 = DNA.

Calibration Drift = [Mean Span Drift* .054 + CI (Span) .030] ÷ [Span] x 100 = 0.84%

*Absolute Value.

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NO$_x$ MONITOR PERFORMANCE TEST DATA SHEET

ZERO AND CALIBRATION DRIFT (24-HOUR)

NO Analyzer - Calibrate on 250 ppm range

Date and Time	Zero Reading ppm	Zero Drift (ΔZero)	Span Reading (After Zero Adjustment) ppm	Calibration Drift (ΔSpan)
1/12/79 10AM	1.0		234	—
1/13/79 10AM	2.6	+1.6	240	+6
1/14/79 10AM	0	-1.0	232	-2
1/15/79 10AM	.5	-.5	229	+5
1/16/79 10AM	0	-1.0	230	-4
1/17/79 10AM	5.5	+4.5	236	+2
1/18/79 10AM	0	-1.0	237	+3
1/19/79 10AM	2.6	+1.6	233	-1

Zero Drift = [Mean Zero Drift* 1.600 + C.I. (Zero) 1.235]
÷ [Instrument Span] x 100 = 1.13%.

Calibration Drift = [Mean Span Drift* 3.28 + C.I. (Span) 1.66]
÷ [Instrument Span] x 100 = 1.98%.

*Absolute Value

Calibration Gas Cylinder No. AAL-379

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MONITOR PERFORMANCE TEST DATA SHEET

ZERO AND CALIBRATION DRIFT (24-HOUR)

CO_2 Analyzer   Zero @ 10% offset

Calibrate on range 3 (20%)

Date and Time	Zero Reading	Zero Drift (ΔZero)	Span Reading (After Zero Adjustment)	Calibration Drift (ΔSpan)
1/12/79 10AM	10		17.8%	Cal Cyl # AAL-1827
1/13/79 10AM	10	0	17.8%	0
1/14/79 10AM	10	0	17.8%	0
1/15/79 10AM	10	0	17.9	+.1
1/16/79 10AM	10	0	17.8	-.1
1/17/79 10 AM	10	0	17.8	0
1/18/79 10 AM	10.03	+.03	17.9	+.1
1/19/79 10 AM	10	0	17.8%	0

Zero Drift = [Mean Zero Drift* 0 + C.I. (Zero) 0]

÷ [Instrument Span] x 100 = 0 .

Calibration Drift = [Mean Span Drift* .043 + C.I. (Span) .049]

÷ [Instrument Span] x 100 = 0.46% .

*Absolute Value

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Engineer____________

CO MONITOR PERFORMANCE TEST DATA SHEET

ZERO AND CALIBRATION DRIFT (24-HOUR)

Date and Time	Zero Reading	Zero Drift (ΔZero)	Span Reading (After Zero Adjustment)	Calibration Drift (ΔSpan)
1/12/79 1000	0	—	900	-
1/13 1000	-10	-10	904	+4
1/14 1000	-9	-9	915	+15
1/15 1000	-5	-5	905	+5
1/16 1000	-8	-8	900	0
1/17 1000	-11	-11	890	-10
1/18 1000	+1	+1	918	+18
1/19 1000	+10	+10	908	+8

Zero Drift = [Mean Zero Drift* 7.71 + C.I. (Zero) 3.28]
÷ [Instrument Span] x 100 = 1.10%.

Calibration Drift = [Mean Span Drift* 8.57 + C.I. (Span) 5.84]
÷ [Instrument Span] x 100 = 1.44 .

*Absolute Value

Calibration Gas Cylinder No. AAL·2150

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Engineer________

O2 MONITOR PERFORMANCE TEST DATA SHEET

ZERO AND CALIBRATION DRIFT (24-HOUR)

Date and Time	Zero Reading	Zero Drift (ΔZero)	Span Reading (After Zero Adjustment)	Calibration Drift (ΔSpan)
1/12/78 1000		DNA	9.27	-
1/13		"	9.23	-.04
1/14		"	9.10	-.17
1/15		"	9.48	+.21
1/16		"	9.32	+.05
1/17		"	9.40	+.13
1/18		"	9.05	-.22
1/19		"	9.11	-.16

Zero Drift = [Mean Zero Drift* ________ + C.I. (Zero) ________]
÷ [Instrument Span] x 100 = ________.

Calibration Drift = [Mean Span Drift* 0.14 + C.I. (Span) 0.066]
÷ [Instrument Span] x 100 = 2.07.

***Absolute Value**

Calibration Gas Cylinder No. AAL - 1827

KVB

Engineer ____________

NO MONITOR PERFORMANCE TEST DATA SHEET

RESPONSE TIME FOR CONTINUOUS INSTRUMENTS

Date of Test 1-15-79

Span Gas Concentration 234 ppm

Analyzer Span Setting 250 ppm

Upscale	1	85 seconds
	2	72 seconds
	3	68 seconds

Average upscale response 75 seconds

Downscale	1	85 seconds
	2	86 seconds
	3	87 seconds

Average downscale response 86 seconds.

System average response time (slower time) = 86 seconds.

% deviation from slower system average response $= \left[\frac{\text{average upscale minus average downscale}}{\text{slower time}}\right] \times 100\% =$ 12.8%

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Engineer ____________

CO₂ MONITOR PERFORMANCE TEST DATA SHEET

RESPONSE TIME FOR CONTINUOUS INSTRUMENTS

Date of Test 1-15-79

Span Gas Concentration 17.8 % ~~ppm~~

Analyzer Span Setting 20 % ~~ppm~~

Upscale
1 90 seconds
2 88 seconds
3 89 seconds

Average upscale response 89 seconds

Downscale
1 88 seconds
2 104 seconds
3 103 seconds

Average downscale response 98 seconds.

System average response time (slower time) = 98 seconds.

% deviation from slower system average response = $\left[\frac{\text{average upscale minus average downscale}}{\text{slower time}}\right] \times 100\% =$ 9.2.

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Engineer ____________

CO MONITOR PERFORMANCE TEST DATA SHEET

RESPONSE TIME FOR CONTINUOUS INSTRUMENTS

Date of Test 1-15-79

Span Gas Concentration 900 ppm

Analyzer Span Setting 1000 ppm

Upscale
1 71.7 seconds
2 69.3 seconds
3 71.8 seconds

Average upscale response 70.9 seconds

Downscale
1 71.4 seconds
2 70.2 seconds
3 70.0 seconds

Average downscale response 70.5 seconds.

System average response time (slower time) = 70.9 seconds.

$$\text{\% deviation from slower system average response} = \left[\frac{\text{average upscale minus average downscale}}{\text{slower time}}\right] \times 100\% = 0.6\%$$

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Engineer ______________

O_2 MONITOR PERFORMANCE TEST DATA SHEET

RESPONSE TIME FOR CONTINUOUS INSTRUMENTS

Date of Test 1-15-79

Span Gas Concentration 9.3 % ~~ppm~~

Analyzer Span Setting 10 % ~~ppm~~

Upscale
1 71 seconds
2 72 seconds
3 70.5 seconds

Average upscale response 71.2 seconds

Downscale
1 71 seconds
2 72 seconds
3 72 seconds

Average downscale response 71.7 seconds.

System average response time (slower time) = 71.7 seconds.

% deviation from slower system average response = $\left[\frac{\text{average upscale minus average downscale}}{\text{slower time}}\right] \times 100\% = 0.7\%$

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MONITOR PERFORMANCE TEST DATA SHEET

ACCURACY DETERMINATION (NO_x)

Engineer *H. Buening*

Test No.	Date and Time	Reference Method Samples				Analyzer 1-Hour Average (ppm)* NO_x @ 3% O_2, dry		Difference (ppm) NO_x @ 3% O_2, dry	
		NO_x Sample 1 (ppm) @ 3% O_2, dry	NO_x Sample 2 (ppm) @ 3% O_2, dry	NO_x Sample 3 (ppm) @ 3% O_2, dry	NO_x Sample Average (ppm) @ 3% O_2, dry				
1	1-16-79 10:20	381	382	415	393		397		4
2	1-16-79 11:20	361	365	370	365		383		18
3	1-16-79 12:20	390	385	376	384		376		8
4	1-16-79 13:30	Bad Sample	405	395	400		390		10
5	1-16-79 14:30	418	414	377	403		393		10
6	1-16-79 15:30	392	370	365	376		376		0
7	1-16-79 16:30	408	431	420	420		391		29
8	1-16-79 17:30	434	Bad Sample	446	440		399		41
9	1-16-79 18:30	Bad Sample	478	483	481		430		51

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Mean reference method test value (NO_x) 407

Mean of the differences 19'

95% Confidence intervals = ± 12.1 ppm (NO_x)

$$\text{Accuracies} = \frac{\text{Mean of the differences + 95\% confidence interval}}{\text{Mean reference method value}} \times 100 = 7.64\ \%\ (NO_x)$$

* Explain and report method used to determine integrated averages

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MONITOR PERFORMANCE TEST DATA SHEET

ACCURACY DETERMINATION (NO_x)

Engineer ____

Test No.	Date and Time	Reference Method Samples NO_x Sample 1 (ppm) @3% O₂ dry	 NO_x Sample 2 (ppm) @3% O₂ dry	 NO_x Sample 3 (ppm) @3% O₂ dry	 NO_x Sample Average (ppm) @3% O₂ dry	Analyzer 1-Hour Average (ppm)* @3% O₂ dry	NO_x	Difference (ppm) @3% O₂ dry	NO_x
1	2-22-79 8:30	303	Broken	311	307		291		16
2	2-22-79 9:35	352	330	339	340		309		31
3	2-22-79 10:32	Broken	Broken	318	318		302		16
4	2-22-79 11:33	312	324	301	312		296		16
5	2-22-79 12:30	337	296	318	317		298		19
6	2-22-79 13:30	314	308	280	301		287		14
7	2-22-79 14:30	Broken	279	320	300		300		0
8	2-22-79 15:30	360	346	357	354		298		56
9	2-22-79 16:30	266	290	263	273		252		21

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Mean reference method test value (NO_x) 314

Mean of the differences 21

95% Confidence intervals = ± 11.83 ppm (NO_x)

Accuracies = $\frac{\text{Mean of the differences + 95\% confidence interval}}{\text{Mean reference method value}}$ x 100 = 10.46 % (NO_x)

* Explain and report method used to determine integrated averages

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APPENDIX D

CONTINUOUS MONITOR PERFORMANCE SPECIFICATIONS

PERFORMANCE SPECIFICATION 2—PERFORMANCE SPECIFICATIONS AND SPECIFICATION TEST PROCEDURES FOR MONITORS OF SO_2 AND NO_x FROM STATIONARY SOURCES

1. Principle and Applicability.

1.1 Principle. The concentration of sulfur dioxide or oxides of nitrogen pollutants in stack emissions is measured by a continuously operating emission measurement system. Concurrent with operation of the continuous monitoring system, the pollutant concentrations are also measured with reference methods (Appendix A). An average of the continuous monitoring system data is computed for each reference method testing period and compared to determine the relative accuracy of the continuous monitoring system. Other tests of the continuous monitoring system are also performed to determine calibration error, drift, and response characteristics of the system.

1.2 Applicability. This performance specification is applicable to evaluation of continuous monitoring systems for measurement of nitrogen oxides or sulfur dioxide pollutants. These specifications contain test procedures, installation requirements, and data computation procedures for evaluating the acceptability of the continuous monitoring systems.

2. Apparatus.

2.1 Calibration Gas Mixtures. Mixtures of known concentrations of pollutant gas in a diluent gas shall be prepared. The pollutant gas shall be sulfur dioxide or the appropriate oxide(s) of nitrogen specified by paragraph 6 and within subparts. For sulfur dioxide gas mixtures, the diluent gas may be air or nitrogen. For nitric oxide (NO) gas mixtures, the diluent gas shall be oxygen-free (<10 ppm) nitrogen, and for nitrogen dioxide (NO_2) gas mixtures the diluent gas shall be air. Concentrations of approximately 50 percent and 90 percent of span are required. The 90 percent gas mixture is used to set and to check the span and is referred to as the span gas.

2.2 Zero Gas. A gas certified by the manufacturer to contain less than 1 ppm of the pollutant gas or ambient air may be used.

2.3 Equipment for measurement of the pollutant gas concentration using the reference method specified in the applicable standard.

2.4 Data Recorder. Analog chart recorder or other suitable device with input voltage range compatible with analyzer system output. The resolution of the recorder's data output shall be sufficient to allow completion of the test procedures within this specification.

2.5 Continuous monitoring system for SO_2 or NO_x pollutants as applicable.

3. Definitions.

3.1 Continuous Monitoring System. The total equipment required for the determination of a pollutant gas concentration in a source effluent. Continuous monitoring systems consist of major subsystems as follows:

3.1.1 Sampling Interface. That portion of an extractive continuous monitoring system that performs one or more of the following operations: Acquisition, transportation, and conditioning of a sample of the source effluent or that portion of an in-situ continuous monitoring system that protects the analyzer from the effluent.

3.1.2 Analyzer. That portion of the continuous monitoring system which senses the pollutant gas and generates a signal output that is a function of the pollutant concentration.

3.1.3 Data Recorder. That portion of the continuous monitoring system that provides a permanent record of the output signal in terms of concentration units.

3.2 Span. The value of pollutant concentration at which the continuous monitoring system is set to produce the maximum data display output. The span shall be set at the concentration specified in each applicable subpart.

3.3 Accuracy (Relative). The degree of correctness with which the continuous monitoring system yields the value of gas concentration of a sample relative to the value given by a defined reference method. This accuracy is expressed in terms of error, which is the difference between the paired concentration measurements expressed as a percentage of the mean reference value.

3.4 Calibration Error. The difference between the pollutant concentration indicated by the continuous monitoring system and the known concentration of the test gas mixture.

3.5 Zero Drift. The change in the continuous monitoring system output over a stated period of time of normal continuous operation when the pollutant concentration at the time for the measurements is zero.

3.6 Calibration Drift. The change in the continuous monitoring system output over a stated time period of normal continuous operations when the pollutant concentration at the time of the measurements is the same known upscale value.

3.7 Response Time. The time interval from a step change in pollutant concentration at the input to the continuous monitoring system to the time at which 95 percent of the corresponding final value is reached as displayed on the continuous monitoring system data recorder.

3.8 Operational Period. A minimum period of time over which a measurement system is expected to operate within certain performance specifications without unscheduled maintenance, repair, or adjustment.

3.9 Stratification. A condition identified by a difference in excess of 10 percent between the average concentration in the duct or stack and the concentration at any point more than 1.0 meter from the duct or stack wall.

4. Installation Specifications. Pollutant continuous monitoring systems (SO_2 and NO_x) shall be installed at a sampling location where measurements can be made which are directly representative (4.1), or which can be corrected so as to be representative (4.2) of the total emissions from the affected

facility. Conformance with this requirement shall be accomplished as follows:

4.1 Effluent gases may be assumed to be nonstratified if a sampling location eight or more stack diameters (equivalent diameters) downstream of any air in-leakage is selected. This assumption and data correction procedures under paragraph 4.2.1 may not be applied to sampling locations upstream of an air preheater in a steam generating facility under Subpart D of this part. For sampling locations where effluent gases are either demonstrated (4.3) or may be assumed to be nonstratified (eight diameters), a point (extractive systems) or path (in-situ systems) of average concentration may be monitored.

4.2 For sampling locations where effluent gases cannot be assumed to be nonstratified (less than eight diameters) or have been shown under paragraph 4.3 to be stratified, results obtained must be consistently representative (e.g. a point of average concentration may shift with load changes) or the data generated by sampling at a point (extractive systems) or across a path (in-situ systems) must be corrected (4.2.1 and 4.2.2) so as to be representative of the total emissions from the affected facility. Conformance with this requirement may be accomplished in either of the following ways:

4.2.1 Installation of a diluent continuous monitoring system (O_2 or CO_2 as applicable) in accordance with the procedures under paragraph 4.2 of Performance Specification 3 of this appendix. If the pollutant and diluent monitoring systems are not of the same type (both extractive or both in-situ), the extractive system must use a multipoint probe.

4.2.2 Installation of extractive pollutant monitoring systems using multipoint sampling probes or in-situ pollutant monitoring systems that sample or view emissions which are consistently representative of the total emissions for the entire cross section. The Administrator may require data to be submitted to demonstrate that the emissions sampled or viewed are consistently representative for several typical facility process operating conditions.

4.3 The owner or operator may perform a traverse to characterize any stratification of effluent gases that might exist in a stack or duct. If no stratification is present, sampling procedures under paragraph 4.1 may be applied even though the eight diameter criteria is not met.

4.4 When single point sampling probes for extractive systems are installed within the stack or duct under paragraphs 4.1 and 4.2.1, the sample may not be extracted at any point less than 1.0 meter from the stack or duct wall. Multipoint sampling probes installed under paragraph 4.2.2 may be located at any points necessary to obtain consistently representative samples.

5. Continuous Monitoring System Performance Specifications.

The continuous monitoring system shall meet the performance specifications in Table 2-1 to be considered acceptable under this method.

TABLE 2-1.—*Performance specifications*

Parameter	*Specification*
1. Accuracy [1]	≤20 pct of the mean value of the reference method test data.
2. Calibration error [1]	≤5 pct of each (50 pct, 90 pct) calibration gas mixture value.
3. Zero drift (2 h) [1]	2 pct of span
4. Zero drift (24 h) [1]	Do.
5. Calibration drift (2 h) [1]	Do.
6. Calibration drift (24 h) [1]	2.5 pct. of span
7. Response time	15 min maximum.
8. Operational period	168 h minimum.

[1] Expressed as sum of absolute mean value plus 95 pct confidence interval of a series of tests.

6. Performance Specification Test Procedures. The following test procedures shall be used to determine conformance with the requirements of paragraph 5. For NO_x analyzers that oxidize nitric oxide (NO) to nitrogen dioxide (NO_2), the response time test under paragraph 6.3 of this method shall be performed using nitric oxide (NO) span gas. Other tests for NO_x continuous monitoring systems under paragraphs 6.1 and 6.2 and all tests for sulfur dioxide systems shall be performed using the pollutant span gas specified by each subpart.

6.1 Calibration Error Test Procedure. Set up and calibrate the complete continuous monitoring system according to the manufacturer's written instructions. This may be accomplished either in the laboratory or in the field.

6.1.1 Calibration Gas Analyses. Triplicate analyses of the gas mixtures shall be performed within two weeks prior to use using Reference Methods 6 for SO_2 and 7 for NO_x. Analyze each calibration gas mixture (50%, 90%) and record the results on the example sheet shown in Figure 2-1. Each sample test result must be within 20 percent of the averaged result or the tests shall be repeated. This step may be omitted for non-extractive monitors where dynamic calibration gas mixtures are not used (6.1.2).

6.1.2 Calibration Error Test Procedure. Make a total of 15 nonconsecutive measurements by alternately using zero gas and each calibration gas mixture concentration (e.g., 0%, 50%, 0%, 90%, 50%, 90%, 50%, 0%, etc.). ~~For nonextractive continuous monitoring systems, this test procedure may be performed by using two or more calibration gas~~

cells whose concentrations are certified by the manufacturer to be functionally equivalent to these gas concentrations. Convert the continuous monitoring system output readings to ppm and record the results on the example sheet shown in Figure 2-2.

6.2 Field Test for Accuracy (Relative), Zero Drift, and Calibration Drift. Install and operate the continuous monitoring system in accordance with the manufacturer's written instructions and drawings as follows:

6.2.1 Conditioning Period. Offset the zero setting at least 10 percent of the span so that negative zero drift can be quantified. Operate the system for an initial 168-hour conditioning period in normal operating manner.

6.2.2 Operational Test Period. Operate the continuous monitoring system for an additional 168-hour period retaining the zero offset. The system shall monitor the source effluent at all times except when being zeroed, calibrated, or backpurged.

6.2.2.1 Field Test for Accuracy (Relative). For continuous monitoring systems employing extractive sampling, the probe tip for the continuous monitoring system and the probe tip for the Reference Method sampling train should be placed at adjacent locations in the duct. For NO_x continuous monitoring systems, make 27 NO_x concentration measurements, divided into nine sets, using the applicable reference method. No more than one set of tests, consisting of three individual measurements, shall be performed in any one hour. All individual measurements of each set shall be performed concurrently, or within a three-minute interval and the results averaged. For SO_2 continuous monitoring systems, make nine SO_2 concentration measurements using the applicable reference method. No more than one measurement shall be performed in any one hour. Record the reference method test data and the continuous monitoring system concentrations on the example data sheet shown in Figure 2-3.

6.2.2.2 Field Test for Zero Drift and Calibration Drift. For extractive systems, determine the values given by zero and span gas pollutant concentrations at two-hour intervals until 15 sets of data are obtained. ~~For nonextractive measurement systems, the zero value may be determined by mechanically producing a zero condition that provides a system check of the analyzer internal mirrors and all electronic circuitry including the radiation source and detector assembly or by inserting three or more calibration gas cells and computing the zero point from the upscale measurements. If this latter technique is used, a graph(s) must be retained by the owner or operator for each measurement system that shows the relationship between the upscale measurements and the zero point. The span of the system shall be checked by using a calibration gas cell certified by the manufacturer to be functionally equivalent to 50 percent of span concentration.~~ Record the zero and span measurements (or the computed zero drift) on the example data sheet shown in Figure 2-4. The two-hour periods over which measurements are conducted need not be consecutive but may not overlap. All measurements required under this paragraph may be conducted concurrent with tests under paragraph 6.2.2.1.

6.2.2.3 Adjustments. Zero and calibration corrections and adjustments are allowed only at 24-hour intervals or at such shorter intervals as the manufacturer's written instructions specify. Automatic corrections made by the measurement system without operator intervention or initiation are allowable at any time. During the entire 168-hour operational test period, record on the example sheet shown in Figure 2-5 the values given by zero and span gas pollutant concentrations before and after adjustment at 24-hour intervals.

6.3 Field Test for Response Time.

6.3.1 Scope of Test. Use the entire continuous monitoring system as installed, including sample transport lines if used. Flow rates, line diameters, pumping rates, pressures (do not allow the pressurized calibration gas to change the normal operating pressure in the sample line), etc., shall be at the nominal values for normal operation as specified in the manufacturer's written instructions. If the analyzer is used to sample more than one pollutant source (stack), repeat this test for each sampling point.

6.3.2 Response Time Test Procedure. Introduce zero gas into the continuous monitoring system sampling interface or as close to the sampling interface as possible. When the system output reading has stabilized, switch quickly to a known concentration of pollutant gas. Record the time from concentration switching to 95 percent of final stable response. For non-extractive monitors, the highest available calibration gas concentration shall be switched into and out of the sample path and response times recorded. Perform this test sequence three (3) times. Record the results of each test on the example sheet shown in Figure 2-6.

7. Calculations, Data Analysis and Reporting.

7.1 Procedure for determination of mean values and confidence intervals.

7.1.1 The mean value of a data set is calculated according to equation 2-1.

$$\bar{x}=\frac{1}{n}\sum_{i=1}^{n}x_i \qquad \text{Equation 2-1}$$

where:

x_i = absolute value of the measurements,
Σ = sum of the individual values,
$\bar{x}$ = mean value, and
n = number of data points.

7.1.2 The 95 percent confidence interval (two-sided) is calculated according to equation 2-2:

$$C.I._{95}=\frac{t_{.975}}{n\sqrt{n-1}}\sqrt{n(\sum x_i^2)-(\sum x_i)^2} \qquad \text{Equation 2-2}$$

where:

$\sum x_i$ = sum of all data points,

$t_{.975} = t_{1-\alpha/2}$, and

C.I.$_{95}$ = 95 percent confidence interval estimate of the average mean value.

Values for $t_{.975}$

n	$t_{.975}$
2	12.706
3	4.303
4	3.182
5	2.776
6	2.571
7	2.447
8	2.365
9	2.306
10	2.262
11	2.228
12	2.201
13	2.179
14	2.160
15	2.145
16	2.131

The values in this table are already corrected for n−1 degrees of freedom. Use n equal to the number of samples as data points.

7.2 Data Analysis and Reporting.

7.2.1 Accuracy (Relative). For each of the nine reference method test points, determine the average pollutant concentration reported by the continuous monitoring system. These average concentrations shall be determined from the continuous monitoring system data recorded under 7.2.2 by integrating or averaging the pollutant concentrations over each of the time intervals concurrent with each reference method testing period. Before proceeding to the next step, determine the basis (wet or dry) of the continuous monitoring system data and reference method test data concentrations. If the bases are not consistent, apply a moisture correction to either reference method concentrations or the continuous monitoring system concentrations as appropriate. Determine the correction factor by moisture tests concurrent with the reference method testing periods. Report the moisture test method and the correction procedure employed. For each of the nine test runs determine the difference for each test run by subtracting the respective reference method test concentrations (use average of each set of three measurements for NO_x) from the continuous monitoring system integrated or averaged concentrations. Using these data, compute the mean difference and the 95 percent confidence interval of the differences (equations 2-1 and 2-3). Accuracy is reported as the sum of the absolute value of the mean difference and the 95 percent confidence interval of the differences expressed as a percentage of the mean reference method value. Use the example sheet shown in Figure 2-3.

7.2.2 Calibration Error. Using the data from paragraph 6.1, subtract the measured pollutant concentration determined under paragraph 6.1.1 (Figure 2-1) from the value shown by the continuous monitoring system for each of the five readings at each concentration measured under 6.1.2 (Figure 2-2). Calculate the mean of these difference values and the 95 percent confidence intervals according to equations 2-1 and 2-2. Report the calibration error (the sum of the absolute value of the mean difference and the 95 percent confidence interval) as a percentage of each respective calibration gas concentration. Use example sheet shown in Figure 2-2.

7.2.3 Zero Drift (2-hour). Using the zero concentration values measured each two hours during the field test, calculate the differences between consecutive two-hour readings expressed in ppm. Calculate the mean difference and the confidence interval using equations 2-1 and 2-2. Report the zero drift as the sum of the absolute mean value and the confidence interval as a percentage of span. Use example sheet shown in Figure 2-4.

7.2.4 Zero Drift (24-hour). Using the zero concentration values measured every 24 hours during the field test, calculate the differences between the zero point after zero adjustment and the zero value 24 hours later just prior to zero adjustment. Calculate the mean value of these points and the confidence interval using equations 2-1 and 2-2. Report the zero drift (the sum of the absolute mean and confidence interval) as a percentage of span. Use example sheet shown in Figure 2-5.

7.2.5 Calibration Drift (2-hour). Using the calibration values obtained at two-hour intervals during the field test, calculate the differences between consecutive two-hour readings expressed as ppm. These values should be corrected for the corresponding zero drift during that two-hour period. Calculate the mean and confidence interval of these corrected difference values using equations 2-1 and 2-2. Do not use the differences between non-consecutive readings. Report the calibration drift as the sum of the absolute mean and confidence interval as a percentage of span. Use example sheet shown in Figure 2-4.

7.2.6 Calibration Drift (24-hour). Using the calibration values measured every 24 hours during the field test, calculate the differences between the calibration concentration reading after zero and calibration adjustment, and the calibration concentration reading 24 hours later after zero adjustment but before calibration adjustment. Calculate the mean value of these differences and the confidence interval using equations 2-1 and 2-2. Report the calibration drift (the sum of the absolute mean and confidence interval) as a percentage of span. Use the example sheet shown in Figure 2-5.

7.2.7 Response Time. Using the charts from paragraph 6.3, calculate the time interval from concentration switching to 95 percent to the final stable value for all upscale and downscale tests. Report the mean of the three upscale test times and the mean of the three downscale test times. The two average times should not differ by more than 15 percent of the slower time. Report the slower time as the system response time. Use the example sheet shown in Figure 2-6.

7.2.8 Operational Test Period. During the 168-hour performance and operational test period, the continuous monitoring system shall not require any corrective maintenance, repair, replacement, or adjustment other than that clearly specified as required in the operation and maintenance manuals as routine and expected during a one-week period. If the continuous monitoring system operates within the specified performance parameters and does not require corrective maintenance, repair, replacement or adjustment other than as specified above during the 168-hour test period, the operational period will be successfully concluded. Failure of the continuous monitoring system to meet this requirement shall call for a repetition of the 168-hour test period. Portions of the test which were satisfactorily completed need not be repeated. Failure to meet any performance specifications shall call for a repetition of the one-week performance test period and that portion of the testing which is related to the failed specification. All maintenance and adjustments required shall be recorded. Output readings shall be recorded before and after all adjustments.

8. References.

8.1 "Monitoring Instrumentation for the Measurement of Sulfur Dioxide in Stationary Source Emissions," Environmental Protection Agency, Research Triangle Park, N.C., February 1973.

8.2 "Instrumentation for the Determination of Nitrogen Oxides Content of Stationary Source Emissions," Environmental Protection Agency, Research Triangle Park, N.C., Volume 1, APTD-0847, October 1971; Volume 2, APTD-0942, January 1972.

8.3 "Experimental Statistics," Department of Commerce, Handbook 91, 1963, pp. 3-31, paragraphs 3-3.1.4.

8.4 "Performance Specifications for Stationary-Source Monitoring Systems for Gases and Visible Emissions," Environmental Protection Agency, Research Triangle Park, N.C., EPA-650/2-74-013, January 1974.

Date ____________ Reference Method Used ____

Mid-Range Calibration Gas Mixture

Sample 1 ________ppm

Sample 2 ________ppm

Sample 3 ________ppm

Average ________ppm

High-Range (span) Calibration Gas Mixture

Sample 1 ________ppm

Sample 2 ________ppm

Sample 3 ________ppm

Average ________ppm

Figure 2-1. Analysis of Calibration Gas Mixtures

MONITOR PERFORMANCE TEST DATA Sheet

Calibration Gas Mixture Data (From Figure 2-1)

Mid (50%) _____ppm High (90%) _____ppm

Run #	Calibration Gas Concentration, ppm	Measurement System Reading, ppm	Differences,[1] ppm
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

	Mid	High
Mean difference	_____	_____
Confidence interval	± _____	± _____
Calibration error = $\frac{\text{Mean Difference[2]} + \text{C.I.}}{\text{Average Calibration Gas Concentration}} \times 100$	_____%	_____%

---

[1] Calibration gas concentration - measurement system reading

[2] Absolute value

Figure 2-2. Calibration Error Determination

Test No.	Date and Time	Reference Method Samples					Analyzer 1-Hour Average (ppm)*		Difference (ppm)	
		SO_2 Sample 1 (ppm)	NO Sample 1 (ppm)	NO Sample 2 (ppm)	NO Sample 3 (ppm)	NO_x Sample Average (ppm)	SO_2	NO_x	SO_2	NO_x
1										
2										
3										
4										
5										
6										
7										
8										
9										
Mean reference method test value (SO_2) ____			Mean reference method test value (NO_x) ____				Mean of the differences ____			

95% Confidence Intervals = ± ____ ppm (SO_2) = ± ____ ppm (NO_x)

Accuracies = $\frac{|\text{Mean of the differences}| + \text{95\% confidence interval}}{\text{Mean reference method value}}$ x 100 = ____% (SO_2) = ____% (NO_x)

* Explain and report method used to determine integrated averages

Figure 2-3. Accuracy Determination (SO_2 and NO_x)

Data Set No.	Time Begin	Time End	Date	Zero Reading	Zero Drift (ΔZero)	Span Reading	Span Drift (ΔSpan)	Calibration Drift (Span- Zero)
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

Zero Drift = [Mean Zero Drift* ____ + CI (Zero) ____] ÷ [Span] x 100 = ____.

Calibration Drift = [Mean Span Drift* ____ + CI (Span) ____] ÷ [Span] x 100 = ____.

*Absolute Value.

Figure 2-4. Zero and Calibration Drift (2 Hour)

Date and Time	Zero Reading	Zero Drift (ΔZero)	Span Reading (After zero adjustment)	Calibration Drift (ΔSpan)

Zero Drift = [Mean Zero Drift* ______ + C.I. (Zero) ______]

÷ [Instrument Span] x 100 = ________.

Calibration Drift = [Mean Span Drift* ________ + C.I. (Span) ________]

÷ [Instrument Span] x 100 = ________.

* Absolute value

Figure 2-5. Zero and Calibration Drift (24-hour)

Date of Test ______________

Span Gas Concentration __________ppm

Analyzer Span Setting __________ppm

Upscale
1 ________seconds
2 ________seconds
3 ________seconds
Average upscale response ________seconds

Downscale
1 ________seconds
2 ________seconds
3 ________seconds
Average downscale response ______seconds

System average response time (slower time) = _______seconds.

$$\%\text{deviation from slower system average response} = \left[\frac{\text{average upscale minus average downscale}}{\text{slower time}}\right] \times 100\% = \_\_\_\_.$$

CO_2 & O_2

Figure 2-6. Response Time

Performance Specification 3—Performance specifications and specification test procedures for monitors of CO_2 and O_2 from stationary sources.

1. Principle and Applicability.

1.1 Principle. Effluent gases are continuously sampled and are analyzed for carbon dioxide or oxygen by a continuous monitoring system. Tests of the system are performed during a minimum operating period to determine zero drift, calibration drift, and response time characteristics.

1.2 Applicability. This performance specification is applicable to evaluation of continuous monitoring systems for measurement of carbon dioxide or oxygen. These specifications contain test procedures, installation requirements, and data computation procedures for evaluating the acceptability of the continuous monitoring systems subject to approval by the Administrator. Sampling may include either extractive or non-extractive (in-situ) procedures.

2. Apparatus.

2.1 Continuous Monitoring System for Carbon Dioxide or Oxygen.

2.2 Calibration Gas Mixtures. Mixture of known concentrations of carbon dioxide or oxygen in nitrogen or air. Midrange and 90 percent of span carbon dioxide or oxygen concentrations are required. The 90 percent of span gas mixture is to be used to set and check the analyzer span and is referred to as span gas. For oxygen analyzers, if the span is higher than 21 percent O_2, ambient air may be used in place of the 90 percent of span calibration gas mixture. Triplicate analyses of the gas mixture (except ambient air) shall be performed within two weeks prior to use using Reference Method 3 of this part.

2.3 Zero Gas. A gas containing less than 100 ppm of carbon dioxide or oxygen.

2.4 Data Recorder. Analog chart recorder or other suitable device with input voltage range compatible with analyzer system output. The resolution of the recorder's data output shall be sufficient to allow completion of the test procedures within this specification.

3. Definitions.

3.1 Continuous Monitoring System. The total equipment required for the determination of carbon dioxide or oxygen in a given source effluent. The system consists of three major subsystems:

3.1.1 Sampling Interface. That portion of the continuous monitoring system that performs one or more of the following operations: Delineation, acquisition, transportation, and conditioning of a sample of the source effluent or protection of the analyzer from the hostile aspects of the sample or source environment.

3.1.2 Analyzer. That portion of the continuous monitoring system which senses the pollutant gas and generates a signal output that is a function of the pollutant concentration.

3.1.3 Data Recorder. That portion of the continuous monitoring system that provides a permanent record of the output signal in terms of concentration units.

3.2 Span. The value of oxygen or carbon dioxide concentration at which the continuous monitoring system is set that produces the maximum data display output. For the purposes of this method, the span shall be set no less than 1.5 to 2.5 times the normal carbon dioxide or normal oxygen concentration in the stack gas of the affected facility.

3.3 Midrange. The value of oxygen or carbon dioxide concentration that is representative of the normal conditions in the stack gas of the affected facility at typical operating rates.

3.4 Zero Drift. The change in the continuous monitoring system output over a stated period of time of normal continuous operation when the carbon dioxide or oxygen concentration at the time for the measurements is zero.

3.5 Calibration Drift. The change in the continuous monitoring system output over a stated time period of normal continuous operation when the carbon dioxide or oxygen continuous monitoring system is measuring the concentration of span gas.

3.6 Operational Test Period. A minimum period of time over which the continuous monitoring system is expected to operate within certain performance specifications without unscheduled maintenance, repair, or adjustment.

3.7 Response time. The time interval from a step change in concentration at the input to the continuous monitoring system to the time at which 95 percent of the corresponding final value is displayed on the continuous monitoring system data recorder.

4. Installation Specification.

Oxygen or carbon dioxide continuous monitoring systems shall be installed at a location where measurements are directly representative of the total effluent from the affected facility or representative of the same effluent sampled by a SO_2 or NO_x continuous monitoring system. This requirement shall be complied with by use of applicable requirements in Performance Specification 2 of this appendix as follows:

4.1 Installation of Oxygen or Carbon Dioxide Continuous Monitoring Systems Not Used to Convert Pollutant Data. A sampling location shall be selected in accordance with the procedures under paragraphs 4.2.1 or 4.2.2, of Performance Specification 2 of this appendix.

4.2 Installation of Oxygen or Carbon Dioxide Continuous Monitoring Systems Used to Convert Pollutant Continuous Monitoring System Data to Units of Applicable Standards. The diluent continuous monitoring system (oxygen or carbon dioxide) shall be installed at a sampling location where measurements that can be made are representative of the effluent gases sampled by the pollutant continuous monitoring system(s). Conformance with this requirement may be accomplished in any of the following ways:

4.2.1 The sampling location for the diluent system shall be near the sampling location for the pollutant continuous monitoring system such that the same approximate point(s) (extractive systems) or path (in-situ systems) in the cross section is sampled or viewed.

4.2.2 The diluent and pollutant continuous monitoring systems may be installed at different locations if the effluent gases at both sampling locations are nonstratified as determined under paragraphs 4.1 or 4.2, Performance Specification 2 of this appendix and there is no in-leakage occurring between the two sampling locations. If the effluent gases are stratified at either location, the procedures under paragraph 4.2.2, Performance Specification 2 of this appendix shall be used for installing continuous monitoring systems at that location.

5. Continuous Monitoring System Performance Specifications.

The continuous monitoring system shall meet the performance specifications in Table 3-1 to be considered acceptable under this method.

6. Performance Specification Test Procedures.

The following test procedures shall be used to determine conformance with the requirements of paragraph 4. Due to the wide variation existing in analyzer designs and principles of operation, these procedures are not applicable to all analyzers. Where this occurs, alternative procedures, subject to the approval of the Administrator, may be employed. Any such alternative procedures must fulfill the same purposes (verify response, drift, and accuracy) as the following procedures, and must clearly demonstrate conformance with specifications in Table 3-1.

6.1 Calibration Check. Establish a calibration curve for the continuous monitoring system using zero, midrange, and span concentration gas mixtures. Verify that the resultant curve of analyzer reading compared with the calibration gas value is consistent with the expected response curve as described by the analyzer manufacturer. If the expected response curve is not produced, additional calibration gas measurements shall be made, or additional steps undertaken to verify the accuracy of the response curve of the analyzer.

6.2 Field Test for Zero Drift and Calibration Drift. Install and operate the continuous monitoring system in accordance with the manufacturer's written instructions and drawings as follows:

TABLE 3-1.—*Performance specifications*

Parameter	*Specification*
1. Zero drift (2 h)[1]	≤0.4 pct O_2 or CO_2.
2. Zero drift (24 h)[1]	≤0.5 pct O_2 or CO_2.
3. Calibration drift (2 h)[1]	≤0.4 pct O_2 or CO_2.
4. Calibration drift (24 h)[1]	≤0.5 pct O_2 or CO_2.
5. Operational period	168 h minimum.
6. Response time	10 min.

[1] Expressed as sum of absolute mean value plus 95 pct confidence interval of a series of tests.

6.2.1 Conditioning Period. Offset the zero setting at least 10 percent of span so that negative zero drift may be quantified. Operate the continuous monitoring system for an initial 168-hour conditioning period in a normal operational manner.

6.2.2. Operational Test Period. Operate the continuous monitoring system for an additional 168-hour period maintaining the zero offset. The system shall monitor the source effluent at all times except when being zeroed, calibrated, or backpurged.

6.2.3 Field Test for Zero Drift and Calibration Drift. Determine the values given by zero and midrange gas concentrations at two-hour intervals until 15 sets of data are obtained. For non-extractive continuous monitoring systems, determine the zero value given by a mechanically produced zero condition or by computing the zero value from upscale measurements using calibrated gas cells certified by the manufacturer. The midrange checks shall be performed by using certified calibration gas cells functionally equivalent to less than 50 percent of span. Record these readings on the example sheet shown in Figure 3-1. These two-hour periods need not be consecutive but may not overlap. In-situ CO_2 or O_2 analyzers which cannot be fitted with a calibration gas cell may be calibrated by alternative procedures acceptable to the Administrator. Zero and calibration corrections and adjustments are allowed only at 24-hour intervals or at such shorter intervals as the manufacturer's written instructions specify. Automatic corrections made by the continuous monitoring system without operator intervention or initiation are allowable at any time. During the entire 168-hour test period, record the values given by zero and span gas concentrations before and after adjustment at 24-hour intervals in the example sheet shown in Figure 3-2.

6.3 Field Test for Response Time.

6.3.1 Scope of Test.

This test shall be accomplished using the continuous monitoring system as installed, including sample transport lines if used. Flow rates, line diameters, pumping rates, pressures (do not allow the pressurized calibration gas to change the normal operating pressure in the sample line), etc., shall be at the nominal values for normal operation as specified in the manufacturer's written instructions. If the analyzer is used to sample more than one source (stack), this test shall be repeated for each sampling point.

6.3.2 Response Time Test Procedure.

Introduce zero gas into the continuous monitoring system sampling interface or as close to the sampling interface as possible. When the system output reading has stabilized, switch quickly to a known concentration of gas at 90 percent of span. Record the time from concentration switching to 95 percent of final stable response. After the system response has stabilized at the upper level, switch quickly to a zero gas. Record the time from concentration switching to 95 percent of final stable response. Alternatively, for nonextractive continuous monitoring systems, the highest available calibration gas concentration shall be switched into and out of the sample path and response times recorded. Perform this test sequence three (3) times. For each test, record the results on the data sheet shown in Figure 3-3.

7. Calculations, Data Analysis, and Reporting.

7.1 Procedure for determination of mean values and confidence intervals.

7.1.1 The mean value of a data set is calculated according to equation 3-1.

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i \qquad \text{Equation 3-1}$$

where:

x_i = absolute value of the measurements,
Σ = sum of the individual values,
$\bar{x}$ = mean value, and
n = number of data points.

7.2.1 The 95 percent confidence interval (two-sided) is calculated according to equation 3-2:

$$C.I._{95} = \frac{t_{.975}}{n\sqrt{n-1}}\sqrt{n(\sum x_i^2) - (\sum x_i)^2} \qquad \text{Equation 3-2}$$

where:

ΣX = sum of all data points,
$t_{.975} = t_{1-\alpha/2}$, and
$C.I._{95}$ = 95 percent confidence interval estimates of the average mean value.

Values for $t_{.975}$

n	$t_{.975}$
2	12.706
3	4.303
4	3.182
5	2.776
6	2.571
7	2.447
8	2.365
9	2.306
10	2.262
11	2.228
12	2.201
13	2.179
14	2.160
15	2.145
16	2.131

The values in this table are already corrected for n–1 degrees of freedom. Use n equal to the number of samples as data points.

7.2 Data Analysis and Reporting.

7.2.1 Zero Drift (2-hour). Using the zero concentration values measured each two hours during the field test, calculate the differences between the consecutive two-hour readings expressed in ppm. Calculate the mean difference and the confidence interval using equations 3–1 and 3–2. Record the sum of the absolute mean value and the confidence interval on the data sheet shown in Figure 3–1.

7.2.2 Zero Drift (24-hour). Using the zero concentration values measured every 24 hours during the field test, calculate the differences between the zero point after zero adjustment and the zero value 24 hours later just prior to zero adjustment. Calculate the mean value of these points and the confidence interval using equations 3–1 and 3–2. Record the zero drift (the sum of the absolute mean and confidence interval) on the data sheet shown in Figure 3–2.

7.2.3 Calibration Drift (2-hour). Using the calibration values obtained at two-hour intervals during the field test, calculate the differences between consecutive two-hour readings expressed as ppm. These values should be corrected for the corresponding zero drift during that two-hour period. Calculate the mean and confidence interval of these corrected difference values using equations 3–1 and 3–2. Do not use the differences between non-consecutive readings. Record the sum of the absolute mean and confidence interval upon the data sheet shown in Figure 3–1.

7.2.4 Calibration Drift (24-hour). Using the calibration values measured every 24 hours during the field test, calculate the differences between the calibration concentration reading after zero and calibration adjustment and the calibration concentration reading 24 hours later after zero adjustment but before calibration adjustment. Calculate the mean value of these differences and the confidence interval using equations 3–1 and 3–2. Record the sum of the absolute mean and confidence interval on the data sheet shown in Figure 3–2.

7.2.5 Operational Test Period. During the 168-hour performance and operational test period, the continuous monitoring system shall not receive any corrective maintenance, repair, replacement, or adjustment other than that clearly specified as required in the manufacturer's written operation and maintenance manuals as routine and expected during a one-week period. If the continuous monitoring system operates within the specified performance parameters and does not require corrective maintenance, repair, replacement or adjustment other than as specified above during the 168-hour test period, the operational period will be successfully concluded. Failure of the continuous monitoring system to meet this requirement shall call for a repetition of the 168 hour test period. Portions of the test which were satisfactorily completed need not be repeated. Failure to meet any performance specifications shall call for a repetition of the one-week performance test period and that portion of the testing which is related to the failed specification. All maintenance and adjustments required shall be recorded. Output readings shall be recorded before and after all adjustments.

7.2.6 Response Time. Using the data developed under paragraph 5.2, calculate the time interval from concentration switching to 95 percent to the final stable value for all upscale and downscale tests. Report the mean of the three upscale test times and the mean of the three downscale test times. The two average times should not differ by more than 15 percent of the slower time. Report the slower time as the system response time. Record the results on Figure 3–3.

8. References.

8.1 "Performance Specifications for Stationary Source Monitoring Systems for Gases and Visible Emissions," Environmental Protection Agency, Research Triangle Park, N.C., EPA–650/2–74–013, January 1974.

8.2 "Experimental Statistics," Department of Commerce, National Bureau of Standards Handbook 91, 1963, pp. 3–31, paragraphs 3–3.1.4.

Data Set No.	Time		Date	Zero Reading	Zero Drift (ΔZero)	Span Reading	Span Drift (ΔSpan)	Calibration Drift [ΔSpan-ΔZero)
	Begin	End						
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

Zero Drift = [Mean Zero Drift* ________ + CI (Zero) ________] = ________.
Calibration Drift = [Mean Span Drift* ______ + CI (Span ________] = ________.
*Absolute Value.

Figure 3-1. Zero and Calibration Drift (2 Hour).

Date and Time	Zero Reading	Zero Drift (ΔZero)	Span Reading (After zero adjustment)	Calibration Drift (ΔSpan)

Zero Drift = [Mean Zero Drift* ______ + C.I. (Zero) ______]

= ______.

Calibration Drift = [Mean Span Drift* ______ + C.I. (Span) ______]

= ______.

* Absolute value

Figure 3-2. Zero and Calibration Drift (24-hour)

Date of Test ______________

Span Gas Concentration _________ ppm

Analyzer Span Setting _________ ppm

Upscale
1. _________ seconds
2. _________ seconds
3. _________ seconds

Average upscale response _________ seconds

Downscale
1. _________ seconds
2. _________ seconds
3. _________ seconds

Average downscale response _________ seconds

System average response time (slower time) = ________ seconds

% deviation from slower system average response = $\frac{\text{average upscale minus average downscale}}{\text{slower time}}$ x 100%

= __________.

Figure 3-3. Response

[40 FR 46259, Oct. 6, 1975; 40 FR 59204, 59205, Dec. 22, 1975, as amended at 42 FR 5937, Jan. 31, 1977]

APPENDIX C—DETERMINATION OF EMISSION RATE CHANGE

1. *Introduction.*

1.1 The following method shall be used to determine whether a physical or operational change to an existing facility resulted in an increase in the emission rate to the atmosphere. The method used is the Student's *t* test, commonly used to make inferences from small samples.

2. *Data.*

2.1 Each emission test shall consist of *n* runs (usually three) which produce *n* emission rates. Thus two sets of emission rates are generated, one before and one after the change, the two sets being of equal size.

2.2 When using manual emission tests, except as provided in § 60.8(b) of this part, the reference methods of Appendix A to this part shall be used in accordance with the procedures specified in the applicable subpart both before and after the change to obtain the data.

2.3 When using continuous monitors, the facility shall be operated as if a manual emission test were being performed. Valid data using the averaging time which would be required if a manual emission test were being conducted shall be used.

3. *Procedure.*

3.1 Subscripts a and b denote prechange and postchange respectively.

3.2 Calculate the arithmetic mean emission rate, $\bar{E}$, for each set of data using Equation 1.

$$\bar{E} = \frac{\sum_{i=1}^{n} E_i}{n} = \frac{E_1 + E_2 \ldots + E_n}{n} \qquad (1)$$

where:

E_i=Emission rate for the *i* th run.

n=number of runs

3.3 Calculate [illegible] mple variance, S^2, for each set of data using Equa[illegible]

$$S^2 = \frac{\sum_{i=1}^{n} (E_i - \bar{E})^2}{n-1} = \frac{\sum_{i=1}^{n} E_i^2 - \left(\sum_{i=1}^{n} E_i\right)^2 / n}{n-1} \qquad (2)$$

3.4 Calculate the pooled estimate, S_p, using Equation 3.

$$S_p = \left[\frac{(n_a - 1)\, S_a^2 + (n_b - 1)\, S_b^2}{n_a + n_b - 2}\right]^{1/2} \qquad (3)$$

3.5 Calculate the test statistic, *t*, using Equation 4.

APPENDIX E

RESULTS OF PREVIOUS TESTS AT SITE 1

This section presents test data gathered at this test site during a previous EPA Sponsored Program. The previous program was "Systems Evaluation of the Use of Low-Sulfur Western Coal in Existing Small and Intermediate-Sized Boilers," EPA Contract No. 68-02-1863.

Emission Data

A summary of the emission data is presented in Table E-1 for both western and eastern coal.

The testing was begun with western coal (Montana Colstrip) and the boiler at 7.56 kg/s (60,000 lb/hr) steam output. The boiler was operating in the normal or "as-found" condition. Tests were conducted at three loads - 11.3, 7.56, and 3.78 kg/s (90, 60, and 30×10^3 lb/hr) steam. At each load the excess O_2 was varied from a "normal" to a higher and lower value if possible. At the high load, O_2 variation was limited by the capacity of the induced draft fan. At low load conditions, the bed was bery thin or areas of the grate were not covered with coal, so that the O_2 could not be lowered below about 13.5% O_2. No control of the undergrate air was possible except for the damper on the forced draft fan. Figure E-1 is a plot of excess oxygen as a function of boiler load when firing Montana Colstrip coal. A line is drawn through the points representing the normal O_2 condition. The range of O_2 variation possible at each load point is shown. Figure E-2 resents the same information for the Illinois Stonefort coal.

The effect of excess O_2 on NO is shown in Figures E-3 and E-4 for western and eastern coals, respectively. Both coals exhibited significant reduction in NO with decreasing O_2. Western coal showed a reduction of 34% in NOx for a 3.5% reduction in O_2. A 3% decrease in O_2 when firing eastern coal resulted in a reduction of 26% in NOx. Carbon monoxide as a function of excess oxygen is presented in Figures E-5 and E-6 for eastern and western coals, respectively. High CO levels were measured with both

TABLE E-1. EMISSION DATA SUMMARY

Test No.	Date	Load kg/s	Load (10^3 lb/hr)	O_2 percent	CO (ppm)	CO_2 (%)	NO(dry) (ppm)	NO_x* (wet) (ppm)	Percent Combust.	Particulates (ng/J)	Particulates (lb/MBtu)	SO_x (ppm)	SO_x (ng/J)	SO_x (lb/MBtu)	Fuel S (ng/J)	Fuel S (lb/MBtu)	Sulfur Retention Factor, percent
WESTERN COAL																	
1	1-13-76	7.56	60	7.9	111	11.0	341	NA		NA	NA	---					
2	1-13-76	7.56	60	6.5	36	12.3	321	308	23.16	388	0.903	1051	862	2.01	953	2.22	90.5
3	1-14-76	7.56	60	10.9	309	10.1	485	447	20.26	447	0.949	1808					
4	1-14-76	7.56	60	11.4	716	8.6	593	593	15.65	429	1.00						
5	1-15-76	11.33	90	7.2	426	12.1	446	424	44.7	888	2.07	1121	919	2.14	719	1.677	122
6	1-16-76	11.33	90	7.5	291	12.3	425	---	27.98	742	1.73	1146					
7	1-21-76	3.78	30	13.6	1619	6.7	403	396	16.42	451	1.06	600	492	1.147	908	2.115	54
8	1-22-76	10.08	80	9.7	634	10.8	482	417	36.05	897	2.09	1540					
9	1-22-76	10.08	80	6.2	380	11.5	294	274	49.14	725	1.69	1576					
10	1-23-76	3.78	30	13.5	1244	7.4	406	422	———	---	----	1407	1155	2.69	1224	2.85	94
	Average	7.06	64	9.44	577		420		29.17	618	1.44	1281	857	1.997	951	2.216	90
EASTERN COAL																	
11	1-26-76	7.56	60	10.0	29	10.3	450	464	44.9	674	1.57	2085	1711	3.99	2119	4.937	80.8
12	1-26-76	7.56	60	12.0	200	8.4	511	538	49.13	1060	2.47	2146					
13	1-27-76	7.56	60	7.8	0	11.5	401	411	51.22	455	1.06	--					
14	1-28-76	11.33	90	7.3	1106	11.1	379	397	49.64	738	1.72	2119	1739	4.053	2195	2.114	79
15	1-29-76	11.33	90	9.1	215	10.3	436	454	46.37	644	1.50	2345	1924	4.484	2215	5.162	86.9
16	1-29-76	11.33	90	10.3	236	9.4	505	540	47.56	880	2.05	--					
17	1-30-76	3.78	30	14.7	484	6.9	404	404	56.61	605	1.41	3094					
18	2-2-76	7.56	60	11.3	13	9.1	445	517	45.63	584	1.36	--					
19	2-2-76	3.78	30	15.8	1275	6.4	506	519	———	---	--	2963	2431	5.665	2144	4.995	112
	Average	7.17	63	10.98	445		449		48.89	704	1.64	2458	1952	4.548	2168	5.052	90
Difference of Western and Eastern, %				-14	+23		-6		-40	-12		-48	-56		-56		

*Corrected for low converter efficiency.

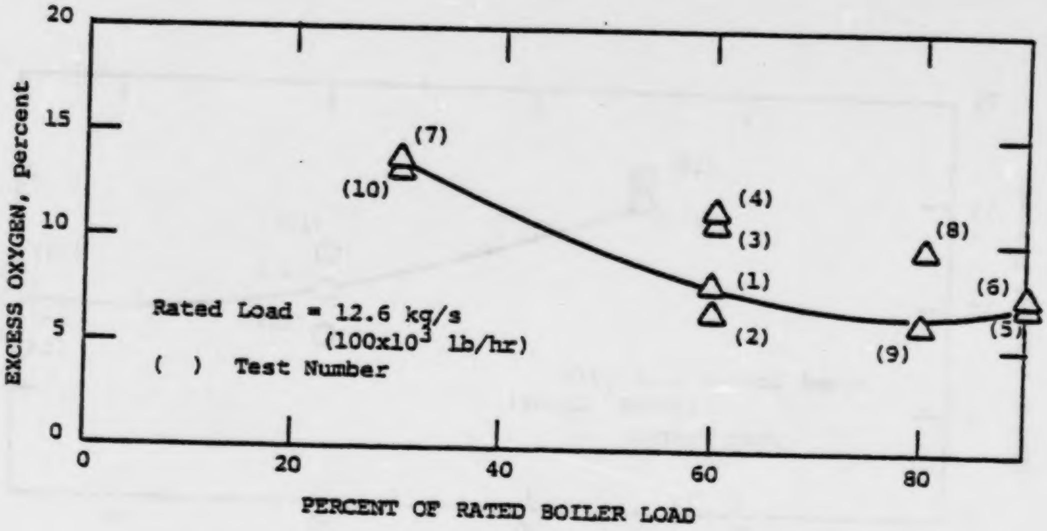

Figure E-1. Excess oxygen vs. boiler load, Montana Colstrip coal.

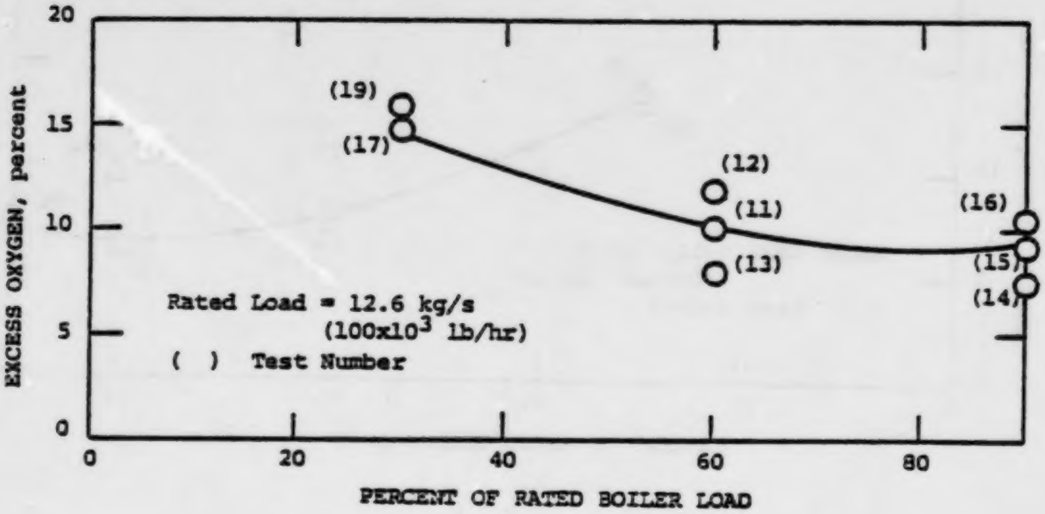

Figure E-2. Excess oxygen vs. boiler load, Illinois Stonefort coal.

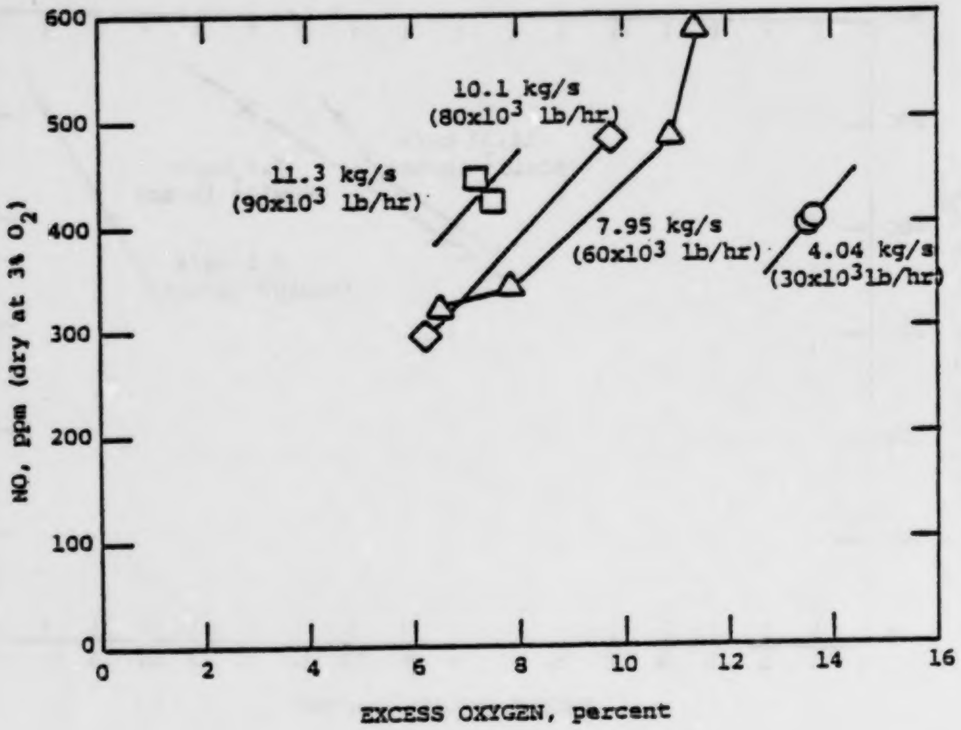

Figure E-3. Nitric Oxide vs. excess oxygen, western coal.

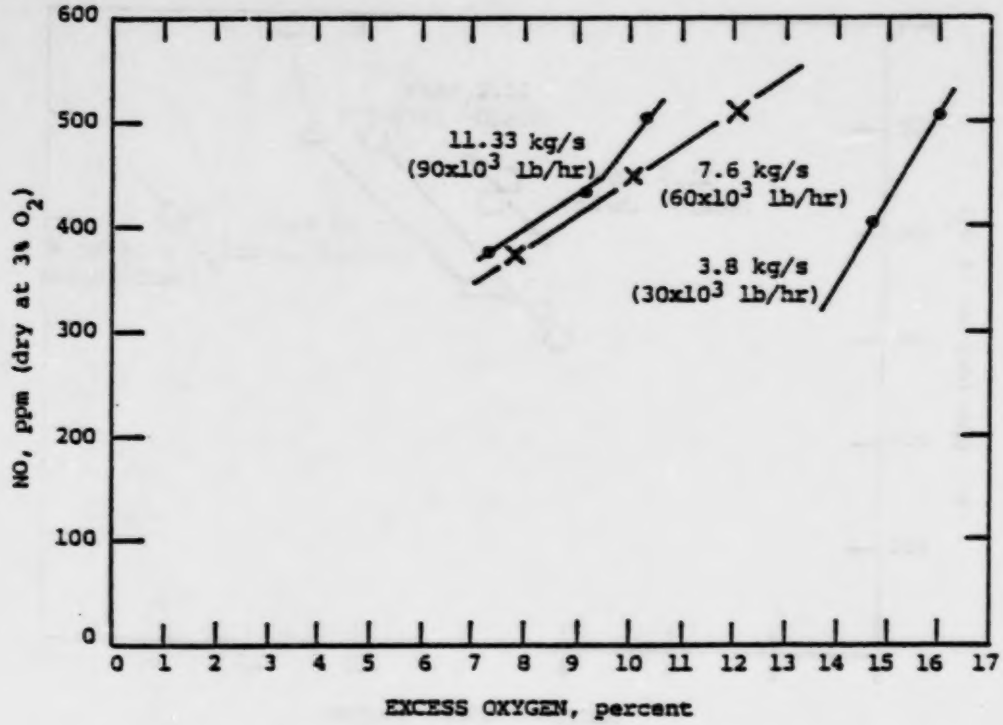

Figure E-4. Nitric oxide vs. excess oxygen, eastern coal.

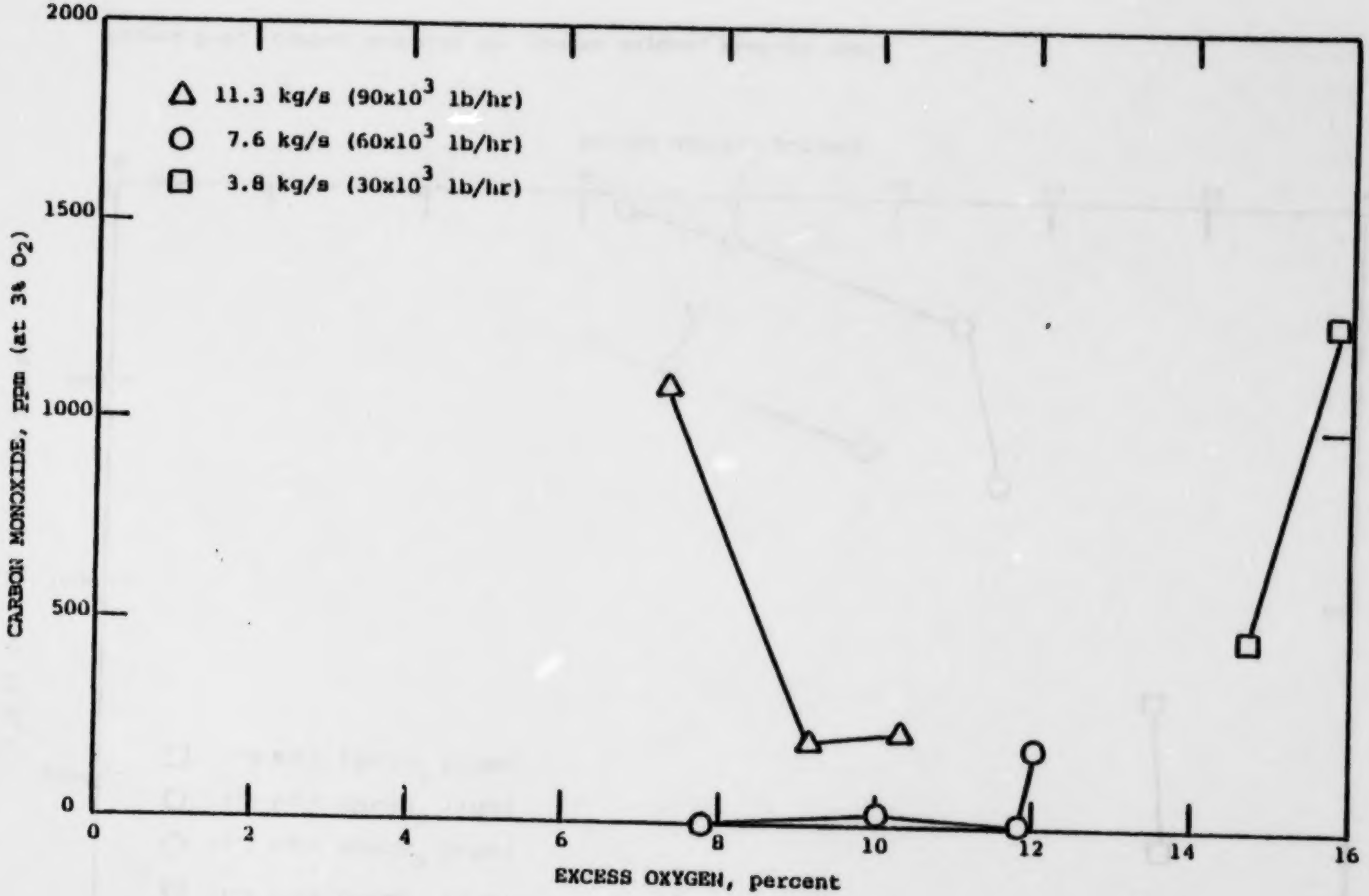

Figure E-5. Carbon monoxide vs. excess oxygen, eastern coal.

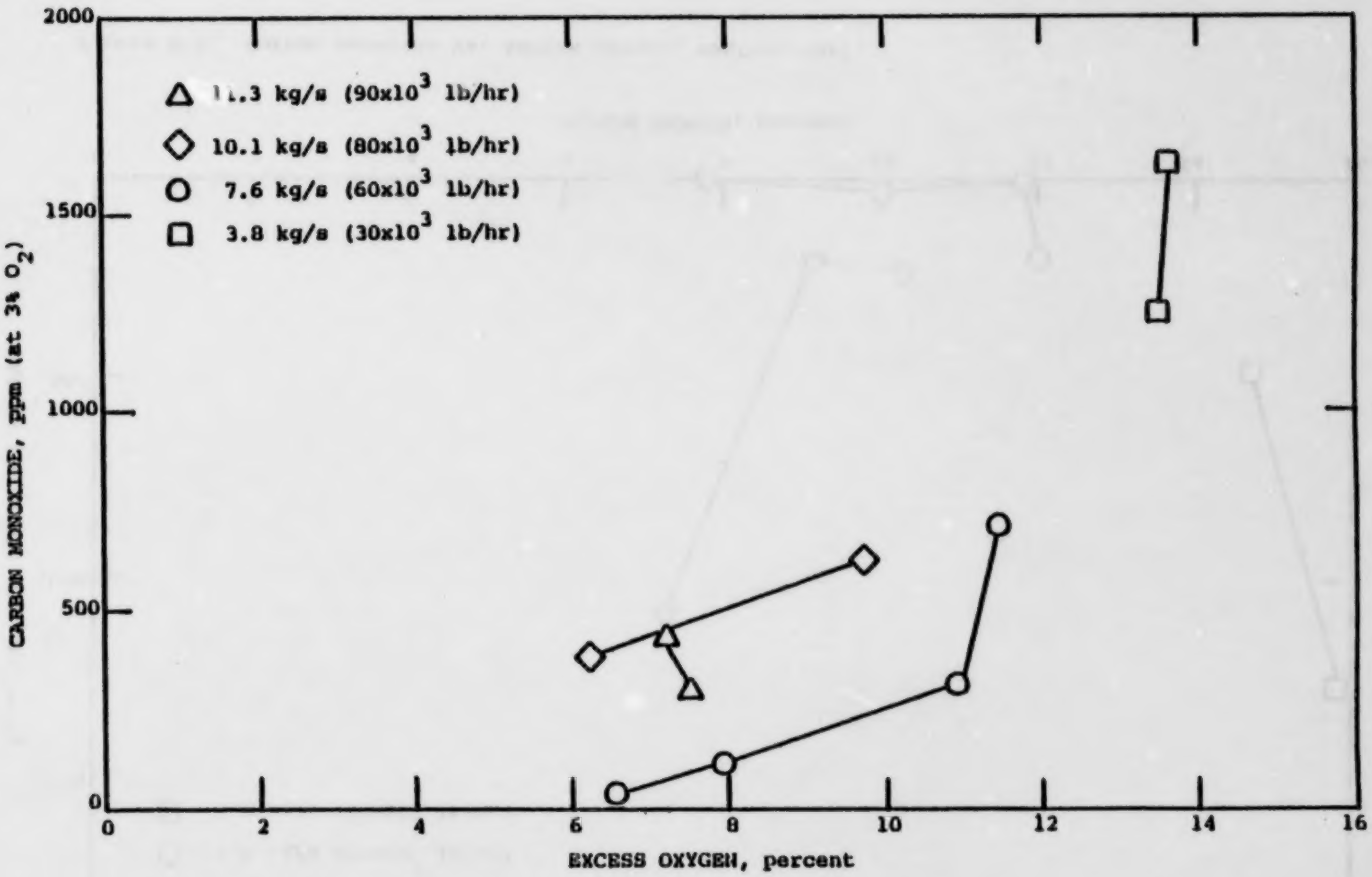

Figure E-6. Carbon monoxide vs. excess oxygen, western coal.

coals at high excess air, low load conditions. The high CO is due to portions of the grate being uncovered which probably leads to quenching and incomplete combustion. Figure E-7 shows the effect of boiler load on NO emissions for both western and eastern coals.

Results of the particulate tests are presented in Figure 5.5-9 where particulate loading as a function of boiler load is shown for both western and eastern coals. The numbers in parentheses refer to the excess oxygen percentage for each test. The particulate loading is seen to be higher for eastern coal at the low and intermediate loads and approximately the same as western coal at the high load condition. The sulfur oxide test results are presented in Table 5.5-2. A summary of the SO_x data was presented in Table 5.5-1 where average SO_x data are tabulated. Fuel samples were taken for each test and were analyzed for sulfur content to complete the analysis of this data.

The hydrocarbon instrument was inoperative until the last week of testing so that no hydrocarbon data could be taken during the normal test period. When the instrument was repaired, two days were used to measure HC emissions with both western and eastern coals. The boiler load was varied and HC measurements made at 3 loads: 5.0, 7.6, and 11.3 kg/s (40, 60, and 90×10^3 lb/hr). The hydrocarbon data show the same trend as the CO data. At low load and high excess O_2, the unburned hydrocarbon emissions increase. This is thought to be due to combustion quenching by the air. The results of the HC measurements are shown below:

Load		Eastern Coal		Western Coal	
kg/s	(10^3 lb/hr)	O_2 (%)	HC (corr. ppm)	O_2 (%)	HC (corr. ppm)
5.0	40	15.	114	13.8	125
7.6	60	12.7	54	11.3	18
11.3	90	9.7	48	—	—
11.3	90	8.7	44	8.8	44

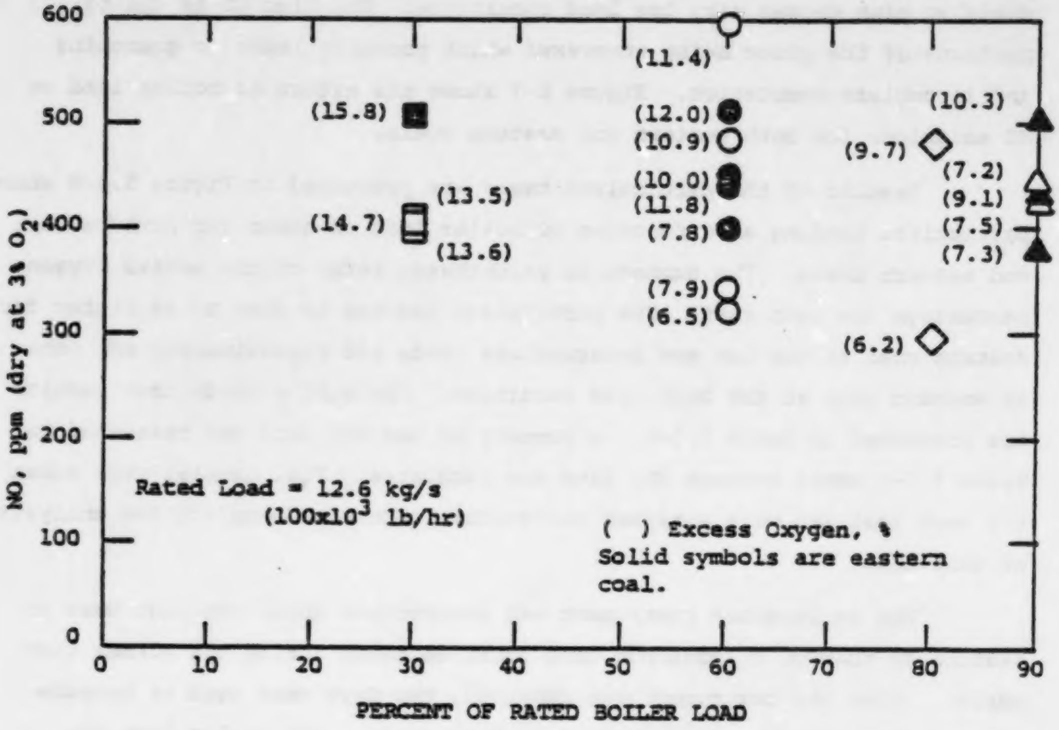

Figure E-7. Nitric oxide vs. boiler load, eastern and western coals.

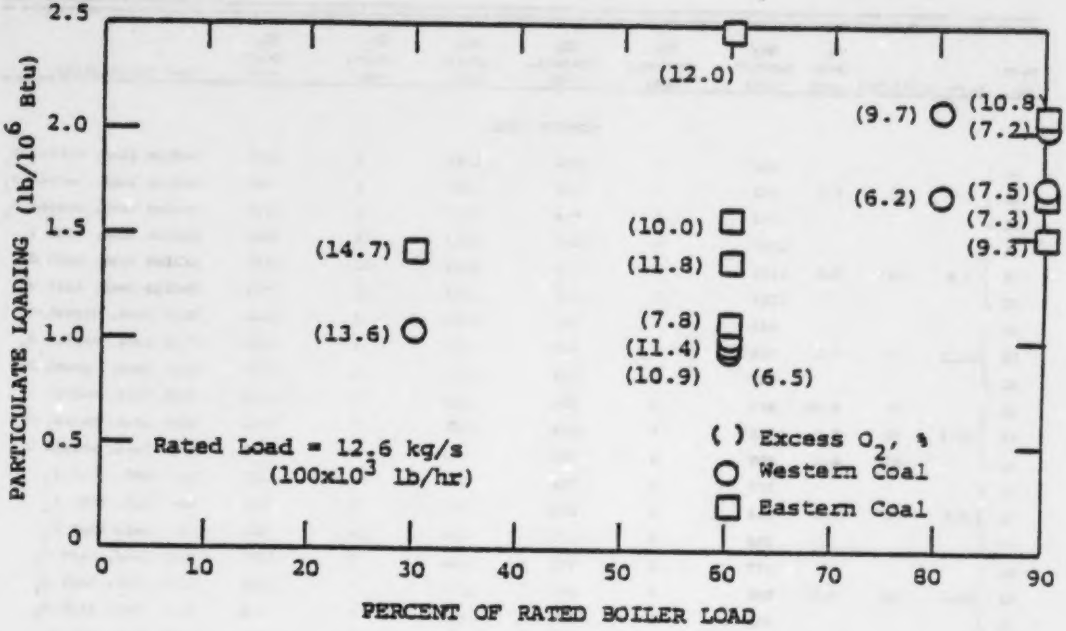

Figure E-8. Particulate loading vs. boiler load.

TABLE E-1. SOx DATA SUMMARY

Test No.	kg/s	(10^3 lb/hr)	O_2 per-cent	SO_2 (uncorr. ppm)	SO_3 (uncorr. ppm)	SO_x (uncorr. ppm)	SO_2 (corr. ppm)	SO_3 (corr. ppm)	SO_x (corr. ppm)	Test Description
						WESTERN COAL				
1A	7.6	60	7.7	854	2	856	1153	3	1156	Medium load, normal O_2
1B				632	2	634	853	3	856	Medium load, normal O_2
1C				842	2	844	1137	3	1140	Medium load, normal O_2
3A	7.6	60	9.6	1047	9	1056	1653	14	1667	Medium load, high O_2
3B				1168	7	1175	1833	11	1844	Medium load, high O_2
3C				1212	7	1219	1902	11	1913	Medium load, high O_2
5A	11.3	90	7.2	853	2	855	1108	3	1111	High load, normal O_2
5B				862	3	865	1120	4	1124	High load, normal O_2
5C				867	2	869	1127	3	1130	High load, normal O_2
6A	11.3	90	8.05	960	4	964	1228	5	1232	High.load, normal O_2
6B		90	8.0	1021	5	1026	1306	7	1313	High load, normal O_2
6C		90	6.9	699	4	703	887	5	892	High load, normal O_2
7A	3.8	30	13.5	247	4	251	593	10	603	Low load, high O_2
7B				238	5	243	571	12	583	Low load, high O_2
7C				250	6	256	600	14	614	Low load, high O_2
8A	10.1	80	9.5	977	5	982	1524	7	1531	High load, high O_2
8B				986	5	991	1538	7	1545	High load, high O_2
8C				981	6	987	1535	9	1544	High load, high O_2
9A	10.1	80	6.7	1284	8	1292	1605	10	1615	High load, low O_2
9B				1223	7	1230	1528	9	1537	High load, low O_2
9C				1255	6	1261	1568	8	1577	High load, low O_2
10A	3.8	30	13.4	597	2	599	1433	5	1438	Low load, high O_2
10B				572	4	576	1316	9	1325	Low load, high O_2
10C				602	6	608	1446	13	1459	Low load, high O_2
						EASTERN COAL				
11A	7.6	60	10.0	1188	3	1191	1936	5	1941	Medium load, normal O_2
11B				1317	9	1326	2147	15	2162	Medium load, normal O_2
11C				1312	8	1320	2138	13	2151	Medium load, normal O_2
12A	7.6	60	12.0	1097	2	1099	2194	4	2198	Medium load, high O_2
12B				1039	4	1043	2078	8	2086	Medium load, high O_2
12C				1069	8	1077	2138	16	2154	Medium load, high O_2
14A	11.3	90	7.3	1505	8	1513	2031	11	2042	High load, low O_2
14B				1497	11	1508	1962	14	1976	High load, low O_2
14C				1809	20	1829	2315	26	2341	High load, low O_2
15A	11.3	90	9.2	1509	—	1509	2293	—	2293	High load, normal O_2
15B				1533	17	1550	2338	26	2364	High load, normal O_2
15C				1547	18	1565	2351	27	2378	High load, normal O_2
17A	3.8	30	14.5	1004	8	1112	2780	21	2801	Low load, high O_2
17B				1078	13	1091	2984	35	3019	Low load, high O_2
17C				1152	3	1155	3455	8	3463	Low load, high O_2
19A	3.8	30	15.5	1170	6	1176	3826	20	3846	Low load, high O_2
19B			15.5	707	5	712	2312	16	2328	Low load, high O_2
19C			16.6	749	6	755	2696	22	2717	Low load, high O_2

Summary of Operational Factors

Normal operation of the boiler when firing coal is conducted at a high excess oxygen percentage to prevent smoking and to assure complete burnout of the coal. When the low excess oxygen test at 7.6 kg/s (60×10^3 lb/hr) was attempted, difficulties were encountered. The operator was requested to lower the air to a level where the air pen and steam pen were coincident on the control room chart. This condition had been satisfactory at a previously higher load.

A patch of unburned coal formed at the rear of the furnace. The low O_2 (4.5% to 5.5%) condition was maintained and the unburned coal patch increased in size. The load then started dropping and the boiler would not respond to load demand. Finally the air was increased to attempt to burn out the unburned patches, but with no success. Grate speed was increased to discharge the unburned coal before clinkers formed. The unburned coal ignited when it dropped into the ash pit, making the pulling of ashes dangerous.

At low to intermediate loads the furnace is not hot enough to ignite the coal in suspension, allowing it to fall to the grate. At these loads the air must be kept at a level to assure rapid heat release to maintain ignition. Ignition of the coal is impaired by the low combustion air temperature [256 to 240°K (0 to -20°F)] and high moisture content of the coal. Any unburned spots in the furnace can rapidly create a large mass of unburned coal which is extremely difficult to burn out even with increased excess air. When low excess O_2 conditions are attempted, the coal bed must be observed carefully to detect any unburned coal patches. If any patches are detected, the test should be aborted and the excess O_2 increased.

During a nontesting period, the traveling grate failed. It appeared that the rear seal failed due to overheating and the broken parts jammed the grate. A total of nine grate links were broken. Two test days were lost while the unit was repaired. After the boiler was brought back on-line, the left feeder spill plate appeared bent.

At low load [3.8 gk/s (30×10^3 lb/hr)], a patch of unburned coal accumulated toward the front of the furnace. The left side spill plate was adjusted to try to reduce the coal accumulation in the front of the furnace. The fire was situated too far forward in the furance resulting in bare grate in the rear. The coal size was such that the spreader could not throw coal to the rear of the furance through the hot forward zone. Therefore, much of the coal burned in suspension resulting in bare grate areas in the rear. The rotor speed was increased which improved the situation somewhat.

The excess O_2 at low load conditions could not be reduced below about 13% due to the open grate areas. Therefore, only one O_2 level was tested at low load.

The coal trajectory is governed by several spreader variables. The variables include:

- spill plate setting
- rotor speed
- coal size/density
- rotor blade pitch/size

During the testing on eastern coal, extreme smoking occurred when the O_2 was reduced too far. At the high load setting, the O_2 could not be reduced below 7.5% without the smoke indicator pegging upscale. At 6% O_2, the CO instrument was off scale (>2,000 ppm) and the smoke indicator was pegged at 100%. During all tests on eastern coal, the fire in the furnace was much smokier than with western coal. An uneven bed thickness on the grate will cause the unit to smoke with eastern coal even at normal O_2 levels.

APPENDIX F

TABULATION OF 15-MINUTE DATA

24 HOUR DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
1/16/79		23.5	9.3	9.8	59.	264.	90.	406.	32.	239.
1/17/79		21.7	7.8	11.7	39.	246.	53.	336.	19.	197.
1/18/79		20.5	7.1	12.3	52.	231.	67.	299.	24.	176.
1/19/79		20.5	6.9	12.0	64.	225.	82.	286.	29.	168.
1/20/79		20.6	7.5	11.5	62.	229.	82.	307.	29.	180.
1/21/79		21.0	7.8	11.3	66.	237.	90.	323.	32.	190.
1/22/79		20.7	7.5	11.5	48.	237.	63.	315.	23.	185.
1/23/79		20.1	7.9	11.0	51.	229.	70.	315.	25.	185.
1/24/79		21.1	7.8	11.1	52.	235.	70.	320.	25.	188.
1/25/79		21.3	7.4	11.8	51.	233.	68.	310.	24.	182.
1/26/79		21.2	7.4	11.9	57.	216.	75.	287.	27.	169.
1/27/79		20.1	7.6	11.6	55.	224.	74.	301.	26.	177.
1/28/79		20.4	7.9	11.6	62.	228.	85.	313.	30.	184.
1/29/79		20.5	7.6	11.6	59.	229.	79.	307.	28.	181.
1/30/79		21.0	7.1	12.1	64.	223.	83.	289.	30.	170.
1/31/79		20.6	7.4	11.4	49.	221.	64.	292.	23.	172.
2/ 1/79		21.1	6.5	11.9	60.	228.	74.	282.	26.	166.
2/ 2/79		20.4	6.8	11.8	64.	218.	80.	277.	29.	162.
2/ 3/79		21.1	6.9	11.7	76.	213.	97.	273.	35.	160.
2/ 4/79		21.6	6.5	12.3	76.	211.	98.	262.	34.	154.
2/ 5/79		22.2	6.6	12.3	85.	222.	107.	278.	38.	163.
2/ 6/79		21.2	6.8	12.0	74.	220.	93.	279.	33.	164.
2/ 7/79		20.8	7.2	11.7	45.	220.	58.	288.	21.	169.
2/12/79		20.4	7.9	11.0	35.	230.	48.	316.	17.	185.
2/13/79		20.7	7.5	11.4	42.	231.	56.	308.	20.	181.
2/14/79		19.8	7.2	11.7	40.	212.	52.	278.	19.	163.
2/15/79		18.0	7.1	11.9	34.	210.	44.	273.	16.	160.
2/16/79		19.1	6.9	12.3	35.	214.	45.	274.	16.	161.
2/17/79		21.6	6.3	12.5	46.	221.	57.	271.	20.	159.
2/18/79		20.2	6.5	12.0	48.	218.	60.	271.	22.	159.
2/19/79		21.2	6.0	12.2	51.	221.	62.	265.	22.	155.
2/20/79		20.7	6.8	11.9	52.	217.	66.	276.	24.	162.
2/21/79		17.8	7.9	11.1	39.	203.	54.	279.	19.	164.
2/22/79		18.0	7.8	11.2	46.	202.	62.	277.	22.	163.
2/23/79		14.5	9.6	9.8	45.	193.	72.	306.	26.	180.
2/24/79		16.6	8.5	10.8	46.	187.	67.	270.	24.	159.

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*****************************************************************************************
**                                  15 MIN. DATA                                       **
**                            DRY STACK GAS CONCENTRATION                              **
**                                                                                     **
**                               O2     CO2     CO      NO      CO      NO     CO     NO **
**                       LOAD   VOL%    VOL%   PPMV    PPMV    PPMV    PPMV   NG/J   NG/J **
**    DATE     TIME      MWTH   MEAS    MEAS   MEAS    MEAS    3%O2    3%O2              **
*****************************************************************************************
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 0/ 0/79         0      .0     .0      .0     0.      0.      0.      0.     0.     0.  **
** 1/16/79      1000    24.0    9.7     9.5    66.    242.    106.    389.    38.   228.  **
** 1/16/79      1015    24.0    9.7     9.3    66.    242.    105.    387.    38.   227.  **
** 1/16/79      1030    24.0    9.7     9.3    66.    244.    105.    390.    38.   229.  **
** 1/16/79      1045    24.0   -1.0     9.9    61.    250.     52.    213.    19.   125.  **
** 1/16/79      1100    23.7    9.2    10.3    61.     -1.     93.     -1.    33.    -1.  **
** 1/16/79      1115    23.7    8.8    10.0    67.    246.     99.    364.    35.   214.  **
** 1/16/79      1130    23.7    8.6    10.0    54.    250.     79.    364.    28.   214.  **
** 1/16/79      1145    23.7    3.3    10.3    53.    250.     75.    355.    27.   209.  **
** 1/16/79      1200    23.4    8.8    10.3    52.    260.     77.    385.    27.   226.  **
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**                                15 MIN. DATA                                  **
**                       DRY STACK GAS CONCENTRATION                            **
**                                                                              **
**                        O2     CO2     CO     NO     CO     NO     CO     NO  **
**                LOAD   VOL%   VOL%   PPMV   PPMV   PPMV   PPMV   NG/J   NG/J **
**   DATE   TIME  MWTH   MEAS   MEAS   MEAS   MEAS   3%O2   3%O2               **
**********************************************************************************
** 1/16/79  1215  23.4    9.4    9.6    55.   250.    86.   389.    31.   228. **
** 1/16/79  1230  23.4    8.9    9.6    62.   252.    92.   376.    33.   221. **
** 1/16/79  1245  23.4    9.0    9.8    53.   253.    80.   381.    28.   223. **
** 1/16/79  1300  23.4    9.0    7.6    56.   260.    84.   391.    30.   230. **
** 1/16/79  1315  23.4    9.2    9.6    53.   269.    81.   412.    29.   242. **
** 1/16/79  1330  23.4    9.0    9.6    52.   269.    78.   405.    28.   238. **
** 1/16/79  1345  23.4    9.3    9.7    52.   263.    80.   406.    29.   238. **
** 1/16/79  1400  23.4    8.8    9.3    44.   271.    65.   401.    23.   235. **
** 1/16/79  1415  23.4    9.5   10.0    44.   254.    69.   399.    25.   234. **
** 1/16/79  1430  23.4    9.5    9.1    50.   255.    79.   400.    28.   235. **
** 1/16/79  1445  23.4    9.3    9.1    60.   242.    93.   373.    33.   219. **
** 1/16/79  1500  23.4    9.5    9.3    70.   235.   110.   369.    39.   217. **
** 1/16/79  1515  23.4    9.4    9.3    70.   243.   109.   378.    39.   222. **
** 1/16/79  1530  23.4    9.3    9.3    70.   244.   108.   377.    39.   221. **
** 1/16/79  1545  23.4    8.8    9.3    60.   253.    89.   374.    32.   220. **
** 1/16/79  1600  23.4    9.7    6.9    60.   258.    96.   414.    34.   243. **
** 1/16/79  1615  23.4    9.9    9.8    67.   244.   109.   397.    39.   233. **
** 1/16/79  1630  23.4    9.7    9.1    59.   245.    94.   392.    34.   230. **
** 1/16/79  1645  23.4    9.2    9.1    61.   248.    94.   381.    33.   224. **
** 1/16/79  1700  23.4    9.5    9.2    62.   256.    97.   402.    35.   236. **
** 1/16/79  1715  23.4    9.3    9.1    65.   269.   100.   415.    36.   244. **
** 1/16/79  1730  23.4    9.6    9.3    67.   268.   106.   425.    38.   249. **
** 1/16/79  1745  23.4    9.9    9.6    79.   270.   129.   439.    46.   258. **
** 1/16/79  1800  23.4    9.7    9.1    89.   273.   142.   436.    51.   256. **
** 1/16/79  1815  23.4    9.7    9.6    71.   271.   113.   433.    41.   254. **
** 1/16/79  1830  23.4    9.8    9.5    70.   273.   113.   440.    40.   258. **
** 1/16/79  1845  23.4    9.9    9.3    70.   278.   114.   452.    41.   266. **
** 1/16/79  1900  23.4    9.4    9.3    70.   284.   109.   442.    39.   260. **
** 1/16/79  1915  23.4    9.4    9.3    70.   281.   109.   437.    39.   257. **
** 1/16/79  1930  23.4    9.3   10.3    71.   270.   110.   417.    39.   245. **
** 1/16/79  1945  23.4    9.4   10.3    60.   268.    93.   417.    33.   245. **
** 1/16/79  2000  23.4    9.6   10.3    58.   266.    92.   421.    33.   247. **
** 1/16/79  2015  23.4    9.4   10.3    60.   272.    93.   423.    33.   249. **
** 1/16/79  2030  23.4    9.4   10.3    58.   266.    90.   414.    32.   243. **
** 1/16/79  2045  23.4    9.4   10.3    54.   270.    84.   420.    30.   247. **
** 1/16/79  2100  23.4    9.1   10.3    50.   274.    76.   416.    27.   244. **
** 1/16/79  2115  23.4    9.4   10.3    49.   260.    76.   405.    27.   238. **
** 1/16/79  2130  23.4    9.0   10.3    46.   274.    69.   412.    25.   242. **
** 1/16/79  2145  23.4    8.9   10.5    48.   280.    72.   418.    26.   245. **
** 1/16/79  2200  23.4    8.9   10.5    48.   290.    72.   433.    26.   254. **
** 1/16/79  2215  23.4    9.0   10.8    50.   290.    75.   436.    27.   256. **
** 1/16/79  2230  23.4    9.0   10.8    51.   298.    77.   448.    27.   263. **
** 1/16/79  2245  23.4    9.0   10.8    52.   294.    78.   442.    28.   260. **
** 1/16/79  2300  23.4    9.0   10.8    49.   284.    74.   427.    26.   251. **
** 1/16/79  2315  23.4    9.0   10.8    41.   289.    62.   435.    22.   255. **
** 1/16/79  2330  23.4    9.0   10.5    46.   280.    69.   421.    25.   247. **
** 1/16/79  2345  23.4    8.8   10.5    49.   278.    72.   411.    26.   241. **
** 1/16/79  2400  23.4    8.8   10.5    51.   276.    75.   408.    27.   240. **
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15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
1/17/79	15	23.4	8.8	10.5	56.	280.	83.	414.	30.	243.
1/17/79	30	23.4	8.8	10.8	50.	275.	74.	407.	26.	239.
1/17/79	45	23.4	8.1	10.8	50.	279.	70.	390.	25.	229.
1/17/79	100	23.4	8.1	11.5	48.	281.	67.	393.	24.	231.
1/17/79	115	23.4	8.1	11.5	49.	285.	69.	399.	24.	234.
1/17/79	130	23.4	8.1	11.3	49.	285.	69.	399.	24.	234.
1/17/79	145	23.4	8.0	11.3	50.	285.	69.	395.	25.	232.
1/17/79	200	23.4	8.0	11.3	46.	298.	64.	414.	23.	243.
1/17/79	215	23.4	8.0	11.3	48.	298.	67.	414.	24.	243.
1/17/79	230	23.4	8.0	11.5	42.	280.	58.	389.	21.	228.
1/17/79	245	23.4	8.1	11.3	40.	283.	56.	396.	20.	232.
1/17/79	300	23.4	8.1	11.5	39.	285.	55.	399.	19.	234.
1/17/79	315	23.4	8.3	11.5	40.	275.	57.	391.	20.	229.
1/17/79	330	23.4	8.8	11.3	40.	275.	59.	407.	21.	239.
1/17/79	345	23.4	8.8	11.3	43.	272.	64.	402.	23.	236.
1/17/79	400	22.9	8.8	11.3	45.	273.	67.	404.	24.	237.
1/17/79	415	22.9	9.3	11.3	40.	265.	62.	409.	22.	240.
1/17/79	430	22.9	9.3	10.8	40.	265.	62.	409.	22.	240.
1/17/79	445	22.9	9.3	10.8	40.	265.	62.	409.	22.	240.
1/17/79	500	22.9	9.3	10.3	40.	261.	62.	403.	22.	236.
1/17/79	515	22.9	9.3	10.3	40.	265.	62.	409.	22.	240.
1/17/79	530	22.9	9.3	10.3	40.	265.	62.	409.	22.	240.
1/17/79	545	22.9	9.5	10.3	40.	261.	63.	410.	22.	241.
1/17/79	600	21.1	9.5	10.3	38.	264.	60.	415.	21.	243.
1/17/79	615	21.1	9.3	10.3	39.	275.	60.	424.	22.	249.
1/17/79	630	21.1	9.1	10.3	40.	282.	61.	428.	22.	251.
1/17/79	645	21.1	9.1	10.3	40.	290.	61.	440.	22.	258.
1/17/79	700	21.1	9.1	10.3	40.	290.	61.	440.	22.	258.
1/17/79	715	21.1	9.1	10.5	40.	292.	61.	443.	22.	260.
1/17/79	730	21.1	9.1	10.5	49.	291.	74.	441.	27.	259.
1/17/79	745	21.1	9.0	10.5	43.	294.	65.	442.	23.	260.
1/17/79	800	24.0	9.1	10.5	43.	283.	65.	429.	23.	252.
1/17/79	815	24.0	8.0	12.1	30.	270.	42.	375.	15.	220.
1/17/79	830	24.0	9.0	12.3	30.	245.	45.	369.	16.	216.
1/17/79	845	24.0	6.7	12.1	20.	238.	25.	300.	9.	176.
1/17/79	900	24.0	8.0	12.1	22.	230.	31.	319.	11.	187.
1/17/79	915	24.0	8.0	11.8	24.	220.	33.	305.	12.	179.
1/17/79	930	24.0	7.0	12.6	25.	238.	32.	306.	12.	180.
1/17/79	945	24.0	6.4	11.8	20.	229.	25.	283.	9.	166.
1/17/79	1000	23.4	7.5	12.3	30.	220.	40.	294.	14.	173.
1/17/79	1015	23.4	7.0	12.3	30.	220.	39.	283.	14.	166.
1/17/79	1030	23.4	6.9	12.3	30.	220.	38.	281.	14.	165.
1/17/79	1045	23.4	7.0	12.3	30.	220.	39.	283.	14.	166.
1/17/79	1100	23.4	7.3	12.1	30.	218.	39.	287.	14.	168.
1/17/79	1115	23.4	7.3	12.1	30.	218.	39.	287.	14.	168.
1/17/79	1130	23.4	7.3	12.1	30.	218.	39.	287.	14.	168.
1/17/79	1145	23.4	7.3	12.3	32.	220.	42.	290.	15.	170.
1/17/79	1200	19.9	7.2	12.3	36.	219.	47.	286.	17.	168.

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**                                   15 MIN. DATA                                       **
**                           DRY STACK GAS CONCENTRATION                                **
**                                                                                      **
**                              O2     CO2     CO      NO      CO      NO      CO    NO    **
**                      LOAD    VOL%   VOL%    PPMV    PPMV    PPMV    PPMV    NG/J  NG/J  **
**    DATE      TIME    MWTH    MEAS   MEAS    MEAS    MEAS    3%O2    3%O2                **
*****************************************************************************************
** 1/17/79      1215    19.9    7.1    12.3    40.     222.    52.     288.    19.   169.  **
** 1/17/79      1230    19.9    6.8    12.6    38.     222.    48.     282.    17.   165.  **
** 1/17/79      1245    19.9    6.4    12.9    32.     228.    40.     281.    14.   165.  **
** 1/17/79      1300    19.9    6.2    12.9    30.     226.    37.     275.    13.   162.  **
** 1/17/79      1315    19.9    6.4    12.6    45.     229.    56.     283.    20.   166.  **
** 1/17/79      1330    19.9    6.7    12.6    38.     230.    48.     290.    17.   170.  **
** 1/17/79      1345    19.9    6.7    12.6    36.     233.    45.     294.    16.   172.  **
** 1/17/79      1400    20.5    6.8    12.3    40.     240.    51.     305.    18.   179.  **
** 1/17/79      1415    20.5    6.9    12.6    30.     250.    38.     320.    14.   188.  **
** 1/17/79      1430    20.5    6.7    12.6    30.     249.    38.     314.    14.   184.  **
** 1/17/79      1445    20.5    6.6    12.9    32.     250.    40.     313.    14.   184.  **
** 1/17/79      1500    20.5    6.4    12.9    38.     238.    47.     294.    17.   173.  **
** 1/17/79      1515    20.5    6.4    12.9    48.     238.    59.     294.    21.   173.  **
** 1/17/79      1530    20.5    6.4    12.1    42.     235.    52.     290.    19.   170.  **
** 1/17/79      1545    20.5    6.4    12.1    32.     220.    40.     272.    14.   159.  **
** 1/17/79      1600    20.5    7.2    12.1    38.     205.    50.     268.    18.   157.  **
** 1/17/79      1615    20.5    7.7    12.1    40.     215.    54.     292.    19.   171.  **
** 1/17/79      1630    20.5    7.6    12.1    40.     218.    54.     293.    19.   172.  **
** 1/17/79      1645    20.5    7.4    11.8    44.     218.    58.     289.    21.   170.  **
** 1/17/79      1700    20.5    7.5    11.8    48.     220.    64.     294.    23.   173.  **
** 1/17/79      1715    20.5    7.6    11.8    50.     228.    67.     307.    24.   180.  **
** 1/17/79      1730    20.5    7.7    11.5    42.     228.    57.     309.    20.   182.  **
** 1/17/79      1745    20.5    7.6    11.8    40.     229.    54.     308.    19.   181.  **
** 1/17/79      1800    20.5    7.6    11.8    34.     232.    46.     312.    16.   183.  **
** 1/17/79      1815    20.5    8.0    11.8    34.     240.    47.     333.    17.   196.  **
** 1/17/79      1830    20.5    7.8    11.8    38.     240.    52.     328.    19.   193.  **
** 1/17/79      1845    20.5    7.8    11.8    38.     242.    52.     331.    19.   194.  **
** 1/17/79      1900    20.5    7.8    11.8    32.     242.    44.     331.    16.   194.  **
** 1/17/79      1915    20.5    7.7    11.8    40.     240.    54.     325.    19.   191.  **
** 1/17/79      1930    20.5    7.6    12.1    48.     238.    65.     320.    23.   188.  **
** 1/17/79      1945    20.5    7.6    11.5    40.     238.    54.     320.    19.   188.  **
** 1/17/79      2000    20.5    7.7    11.8    40.     239.    54.     324.    19.   190.  **
** 1/17/79      2015    20.5    7.6    11.8    40.     236.    54.     318.    19.   186.  **
** 1/17/79      2030    20.5    7.5    11.8    40.     220.    53.     294.    19.   173.  **
** 1/17/79      2045    20.5    8.0    12.1    40.     228.    56.     316.    20.   186.  **
** 1/17/79      2100    20.5    7.6    12.1    38.     222.    51.     299.    18.   175.  **
** 1/17/79      2115    20.5    7.6    12.1    38.     223.    51.     300.    18.   176.  **
** 1/17/79      2130    20.5    7.9    12.1    36.     228.    50.     314.    18.   184.  **
** 1/17/79      2145    20.5    7.7    12.1    38.     222.    52.     301.    18.   177.  **
** 1/17/79      2200    20.5    7.4    12.1    40.     222.    53.     294.    19.   173.  **
** 1/17/79      2215    20.5    7.4    11.8    40.     222.    53.     294.    19.   173.  **
** 1/17/79      2230    20.5    7.4    12.1    40.     222.    53.     294.    19.   173.  **
** 1/17/79      2245    20.5    7.5    12.1    40.     224.    53.     299.    19.   176.  **
** 1/17/79      2300    20.5    7.7    12.1    40.     228.    54.     309.    19.   182.  **
** 1/17/79      2315    20.5    7.7    12.1    40.     228.    56.     309.    19.   182.  **
** 1/17/79      2330    20.5    7.6    12.1    40.     228.    54.     307.    19.   180.  **
** 1/17/79      2345    20.5    7.4    11.8    40.     228.    53.     302.    19.   177.  **
** 1/17/79      2400    20.5    8.0    12.1    40.     246.    56.     341.    20.   200.  **
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**                                  15 MIN. DATA                                          **
**                         DRY STACK GAS CONCENTRATION                                    **
**                                                                                        **
**                            O2      CO2     CO      NO      CO      NO      CO      NO  **
**                    LOAD    VOL%    VOL%    PPMV    PPMV    PPMV    PPMV    NG/J    NG/J **
**   DATE     TIME    MWTH    MEAS    MEAS    MEAS    MEAS    3%O2    5%O2                **
********************************************************************************************
** 1/18/79      15    20.5    7.5     12.3    40.     246.    53.     329.    19.     193.  **
** 1/18/79      30    20.5    7.5     12.3    40.     242.    53.     323.    19.     190.  **
** 1/18/79      45    20.5    7.3     12.3    40.     238.    53.     313.    19.     184.  **
** 1/18/79     100    20.5    7.4     12.3    40.     228.    53.     302.    19.     177.  **
** 1/18/79     115    20.5    7.4     12.3    42.     225.    56.     298.    20.     175.  **
** 1/18/79     130    20.5    7.4     12.3    42.     224.    56.     297.    20.     174.  **
** 1/18/79     145    20.5    7.4     12.3    42.     224.    56.     297.    20.     174.  **
** 1/18/79     200    20.5    7.4     12.1    42.     225.    56.     298.    20.     175.  **
** 1/18/79     215    20.5    7.3     12.1    42.     222.    55.     292.    20.     172.  **
** 1/18/79     230    20.5    7.5     12.3    42.     223.    56.     298.    20.     175.  **
** 1/18/79     245    20.5    7.4     12.1    42.     226.    56.     300.    20.     176.  **
** 1/18/79     300    20.5    7.3     12.1    42.     230.    55.     303.    20.     178.  **
** 1/18/79     315    20.5    7.2     12.3    42.     240.    55.     314.    20.     184.  **
** 1/18/79     330    20.5    7.2     12.3    42.     232.    55.     303.    20.     178.  **
** 1/18/79     345    20.5    7.3     12.3    42.     232.    55.     305.    20.     179.  **
** 1/18/79     400    20.5    7.7     12.3    42.     232.    57.     315.    20.     185.  **
** 1/18/79     415    20.5    7.8     11.8    42.     232.    57.     317.    21.     186.  **
** 1/18/79     430    20.5    7.9     11.8    42.     232.    58.     319.    21.     188.  **
** 1/18/79     445    20.5    7.9     12.1    42.     232.    58.     319.    21.     188.  **
** 1/18/79     500    20.5    7.4     12.1    42.     230.    56.     305.    20.     179.  **
** 1/18/79     515    20.5    7.3     12.1    42.     230.    55.     303.    20.     178.  **
** 1/18/79     530    20.5    7.4     12.1    42.     230.    56.     305.    20.     179.  **
** 1/18/79     545    20.5    7.5     12.1    42.     230.    56.     307.    20.     180.  **
** 1/18/79     600    20.5    7.6     12.1    42.     230.    57.     310.    20.     182.  **
** 1/18/79     615    20.5    7.7     12.1    42.     232.    57.     315.    20.     185.  **
** 1/18/79     630    20.5    7.7     12.1    42.     230.    57.     312.    20.     183.  **
** 1/18/79     645    20.5    7.8     11.5    42.     230.    57.     314.    21.     185.  **
** 1/18/79     700    20.5    7.6     12.1    42.     240.    57.     323.    20.     190.  **
** 1/18/79     715    20.5    7.7     12.1    56.     240.    76.     325.    27.     191.  **
** 1/18/79     730    20.5    6.7     12.9    44.     215.    55.     271.    20.     159.  **
** 1/18/79     745    20.5    6.5     12.9    52.     218.    65.     271.    23.     159.  **
** 1/18/79     800    20.5    6.3     13.2   100.     220.   123.     270.    44.     158.  **
** 1/18/79     815    20.5    6.0     12.6    44.     220.    53.     264.    19.     155.  **
** 1/18/79     830    20.5    6.0     12.3    44.     220.    53.     264.    19.     155.  **
** 1/18/79     845    20.5    7.4     12.1    44.     230.    58.     305.    21.     179.  **
** 1/18/79     900    20.5    7.5     11.8    44.     240.    59.     321.    21.     188.  **
** 1/18/79     915    20.5    7.7     11.8    48.     240.    65.     325.    23.     191.  **
** 1/18/79     930    20.5    7.5     12.3    50.     250.    67.     334.    24.     196.  **
** 1/18/79     945    20.5    7.4     12.6    50.     245.    66.     325.    24.     191.  **
** 1/18/79    1000    20.5    7.2     12.6    48.     245.    63.     320.    22.     188.  **
** 1/18/79    1015    20.5    7.2     12.6    50.     230.    65.     301.    23.     176.  **
** 1/18/79    1030    20.5    7.3     12.9    50.     232.    66.     305.    24.     179.  **
** 1/18/79    1045    20.5    7.5     12.9    50.     242.    67.     323.    24.     190.  **
** 1/18/79    1100    20.5    7.3     12.6    44.     242.    58.     319.    21.     187.  **
** 1/18/79    1115    20.5    7.6     12.6    44.     236.    59.     318.    21.     186.  **
** 1/18/79    1130    20.5    6.8     12.3    50.     242.    63.     307.    23.     180.  **
** 1/18/79    1145    20.5    6.6     12.3    49.     248.    61.     310.    22.     182.  **
** 1/18/79    1200    20.5    7.0     12.3    48.     248.    62.     319.    22.     188.  **
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15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
1/18/79	1215	20.5	6.9	12.3	50.	250.	64.	320.	23.	188.
1/18/79	1230	20.5	7.0	12.3	50.	245.	64.	316.	23.	185.
1/18/79	1245	20.5	6.9	12.3	50.	236.	64.	302.	23.	177.
1/18/79	1300	20.5	6.9	12.1	65.	230.	83.	294.	30.	173.
1/18/79	1315	20.5	6.8	12.6	80.	230.	102.	292.	36.	171.
1/18/79	1330	20.5	7.0	12.3	60.	230.	77.	296.	28.	174.
1/18/79	1345	20.5	7.2	12.6	55.	226.	72.	295.	26.	173.
1/18/79	1400	20.5	6.7	12.6	54.	226.	68.	285.	24.	167.
1/18/79	1415	20.5	6.6	12.3	54.	220.	68.	275.	24.	162.
1/18/79	1430	20.5	6.6	12.3	54.	224.	68.	280.	24.	165.
1/18/79	1445	20.5	7.0	12.3	59.	228.	76.	294.	27.	172.
1/18/79	1500	20.5	7.0	12.3	60.	230.	77.	296.	28.	174.
1/18/79	1515	20.5	6.9	12.3	60.	234.	77.	299.	27.	176.
1/18/79	1530	20.5	6.8	12.1	54.	225.	69.	286.	24.	168.
1/18/79	1545	20.5	7.5	12.3	52.	228.	69.	305.	25.	179.
1/18/79	1600	20.5	6.9	12.3	52.	240.	66.	307.	24.	180.
1/18/79	1615	20.5	7.0	12.3	50.	240.	64.	309.	23.	181.
1/18/79	1630	20.5	7.1	12.3	52.	238.	67.	309.	24.	181.
1/18/79	1645	20.5	7.1	12.3	52.	238.	67.	309.	24.	181.
1/18/79	1700	20.5	7.1	12.3	54.	234.	70.	304.	25.	178.
1/18/79	1715	20.5	7.0	12.3	54.	238.	70.	306.	25.	180.
1/18/79	1730	20.5	7.0	12.3	60.	232.	77.	299.	28.	175.
1/18/79	1745	20.5	7.0	12.3	80.	230.	103.	296.	37.	174.
1/18/79	1800	20.5	7.0	12.6	69.	228.	89.	294.	32.	172.
1/18/79	1815	20.5	6.8	12.3	65.	226.	83.	287.	29.	168.
1/18/79	1830	20.5	6.7	12.3	60.	222.	76.	280.	27.	164.
1/18/79	1845	20.5	6.8	12.3	60.	220.	76.	279.	27.	164.
1/18/79	1900	20.5	6.8	12.3	60.	221.	76.	281.	27.	165.
1/18/79	1915	20.5	6.9	12.3	60.	220.	77.	281.	27.	165.
1/18/79	1930	20.5	6.8	12.1	58.	220.	74.	279.	26.	164.
1/18/79	1945	20.5	6.8	12.3	54.	218.	69.	277.	24.	162.
1/18/79	2000	20.5	6.7	12.3	54.	218.	68.	275.	24.	161.
1/18/79	2015	20.5	6.7	12.3	54.	222.	68.	280.	24.	164.
1/18/79	2030	20.5	6.7	12.6	54.	222.	68.	280.	24.	164.
1/18/79	2045	20.5	6.8	12.6	60.	222.	76.	282.	27.	165.
1/18/79	2100	20.5	6.6	12.6	58.	222.	73.	278.	26.	163.
1/18/79	2115	20.5	6.6	12.6	58.	222.	73.	278.	26.	163.
1/18/79	2130	20.5	6.6	12.6	58.	230.	73.	288.	26.	169.
1/18/79	2145	20.5	6.6	12.6	58.	232.	73.	290.	26.	171.
1/18/79	2200	20.5	6.5	12.3	56.	235.	70.	292.	25.	172.
1/18/79	2215	20.5	6.6	12.6	58.	238.	73.	298.	26.	175.
1/18/79	2230	20.5	6.6	12.6	60.	238.	75.	298.	27.	175.
1/18/79	2245	20.5	6.6	12.3	60.	239.	75.	299.	27.	176.
1/18/79	2300	20.5	6.6	12.6	58.	239.	73.	299.	26.	176.
1/18/79	2315	20.5	6.6	12.6	62.	240.	78.	300.	28.	176.
1/18/79	2330	20.5	6.8	12.3	62.	220.	79.	279.	28.	164.
1/18/79	2345	20.5	7.0	12.3	70.	226.	90.	291.	32.	171.
1/18/79	2400	20.5	6.5	12.3	70.	220.	87.	273.	31.	161.

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**                                      15 MIN. DATA                                     **
**                               DRY STACK GAS CONCENTRATION                             **
**                                                                                       **
**                          O2     CO2      CO      NO      CO      NO      CO      NO   **
**                 LOAD   VOL%    VOL%    PPMV    PPMV    PPMV    PPMV    NG/J    NG/J   **
**    DATE   TIME  MWTH   MEAS    MEAS    MEAS    MEAS    3%O2    3%O2                   **
*******************************************************************************************
** 1/19/79     15  20.5    6.7    12.3     66.    220.     83.    277.     30.    163.   **
** 1/19/79     30  20.5    6.6    12.3     68.    220.     85.    275.     30.    162.   **
** 1/19/79     45  20.5    6.8    12.3     60.    230.     76.    292.     27.    171.   **
** 1/19/79    100  20.5    6.8    12.3     60.    236.     76.    300.     27.    176.   **
** 1/19/79    115  20.5    6.9    12.3     60.    236.     77.    302.     27.    177.   **
** 1/19/79    130  20.5    6.9    12.3     58.    238.     74.    304.     27.    179.   **
** 1/19/79    145  20.5    6.9    12.3     68.    234.     87.    299.     31.    176.   **
** 1/19/79    200  20.5    6.9    12.3     68.    230.     87.    294.     31.    173.   **
** 1/19/79    215  20.5    6.9    12.3     70.    228.     89.    292.     32.    171.   **
** 1/19/79    230  20.5    6.8    12.1     60.    228.     76.    289.     27.    170.   **
** 1/19/79    245  20.5    6.9    11.8     60.    228.     77.    292.     27.    171.   **
** 1/19/79    300  20.5    6.9    12.1     60.    230.     77.    294.     27.    173.   **
** 1/19/79    315  20.5    6.9    12.1     60.    230.     77.    294.     27.    173.   **
** 1/19/79    330  20.5    6.8    12.3     58.    228.     74.    289.     26.    170.   **
** 1/19/79    345  20.5    6.6    12.3     60.    222.     75.    278.     27.    163.   **
** 1/19/79    400  20.5    6.6    12.3     60.    224.     75.    280.     27.    165.   **
** 1/19/79    415  20.5    6.6    12.3     60.    226.     75.    283.     27.    166.   **
** 1/19/79    430  20.5    6.7    12.3     60.    226.     76.    285.     27.    167.   **
** 1/19/79    445  20.5    6.6    12.3     60.    222.     75.    278.     27.    163.   **
** 1/19/79    500  20.5    6.6    12.3     70.    222.     88.    278.     31.    163.   **
** 1/19/79    515  20.5    6.7    12.3     72.    218.     91.    275.     32.    161.   **
** 1/19/79    530  20.5    6.5    12.3     68.    216.     85.    268.     30.    158.   **
** 1/19/79    545  20.5    6.5    12.3     68.    214.     85.    266.     30.    156.   **
** 1/19/79    600  20.5    6.4    12.3    100.    218.    123.    269.     44.    158.   **
** 1/19/79    615  20.5    6.4    12.6     80.    210.     99.    259.     35.    152.   **
** 1/19/79    630  20.5    6.3    12.6     62.    212.     76.    260.     27.    153.   **
** 1/19/79    645  20.5    6.6    12.3     62.    212.     78.    265.     28.    156.   **
** 1/19/79    700  20.5    7.5    12.1     60.    215.     80.    287.     29.    169.   **
** 1/19/79    715  20.5    7.0    12.1     60.    214.     77.    276.     28.    162.   **
** 1/19/79    730  20.5    6.9    11.8     55.    216.     70.    276.     25.    162.   **
** 1/19/79    745  20.5    7.1    12.1     55.    215.     71.    279.     25.    164.   **
** 1/19/79    800  20.5    7.4    11.8     55.    218.     73.    289.     26.    170.   **
** 1/19/79    815  20.5    7.5    11.8     58.    220.     77.    294.     28.    173.   **
** 1/19/79    830  20.5    7.8    11.5     54.    228.     74.    312.     26.    183.   **
** 1/19/79    845  20.5    7.3    11.5     40.    230.     53.    303.     19.    178.   **
** 1/19/79    900  20.5    7.2    11.8     40.    230.     52.    301.     19.    176.   **
** 1/19/79    915  20.5    7.4    12.1     42.    230.     56.    305.     20.    179.   **
** 1/19/79    930  20.5    7.3    11.8     42.    230.     55.    303.     20.    178.   **
** 1/19/79    945  20.5    6.9    11.8     48.    228.     61.    292.     22.    171.   **
** 1/19/79   1000  20.5    6.6    12.3     50.    220.     63.    275.     22.    162.   **
** 1/19/79   1015  20.5    6.5    12.3     60.    221.     75.    275.     27.    161.   **
** 1/19/79   1030  20.5    6.6    12.6     60.    218.     75.    273.     27.    160.   **
** 1/19/79   1045  20.5    6.6    12.3     60.    215.     75.    269.     27.    158.   **
** 1/19/79   1100  20.5    6.5    12.3     90.    215.    112.    267.     40.    157.   **
** 1/19/79   1115  20.5    6.7    12.3     70.    220.     88.    277.     32.    163.   **
** 1/19/79   1130  20.5    6.7    12.3     52.    220.     66.    277.     23.    163.   **
** 1/19/79   1145  20.5    6.8    12.3     62.    222.     79.    282.     28.    165.   **
** 1/19/79   1200  20.5    6.7    12.3     50.    228.     63.    287.     23.    169.   **
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15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
1/19/79	1215	20.5	6.7	12.3	50.	225.	63.	284.	23.	167.
1/19/79	1230	20.5	7.1	12.3	54.	234.	70.	304.	25.	178.
1/19/79	1245	20.5	6.5	12.1	65.	232.	81.	288.	29.	169.
1/19/79	1300	20.5	6.6	10.5	70.	234.	88.	293.	31.	172.
1/19/79	1315	20.5	6.5	11.8	48.	234.	60.	291.	21.	171.
1/19/79	1330	20.5	7.0	12.1	42.	234.	54.	301.	19.	177.
1/19/79	1345	20.5	7.0	11.8	50.	229.	64.	295.	23.	173.
1/19/79	1400	20.5	6.9	11.8	48.	230.	61.	294.	22.	173.
1/19/79	1415	20.5	7.0	11.8	44.	230.	57.	296.	20.	174.
1/19/79	1430	20.5	7.0	11.8	52.	230.	67.	296.	24.	174.
1/19/79	1445	20.5	6.9	11.8	52.	215.	66.	275.	24.	161.
1/19/79	1500	20.5	8.0	11.5	50.	230.	69.	319.	25.	187.
1/19/79	1515	20.5	8.0	11.3	54.	230.	75.	319.	27.	187.
1/19/79	1530	20.5	6.9	10.8	56.	230.	72.	294.	26.	173.
1/19/79	1545	20.5	6.8	11.5	70.	228.	89.	289.	32.	170.
1/19/79	1600	20.5	6.7	11.8	68.	228.	86.	287.	31.	169.
1/19/79	1615	20.5	6.8	11.8	60.	226.	76.	287.	27.	168.
1/19/79	1630	20.5	6.3	12.1	90.	222.	110.	272.	39.	160.
1/19/79	1645	20.5	6.1	12.1	100.	210.	121.	254.	43.	149.
1/19/79	1700	20.5	7.0	12.3	220.	200.	283.	258.	101.	151.
1/19/79	1715	20.5	6.7	11.8	200.	208.	252.	262.	90.	154.
1/19/79	1730	20.5	7.9	12.1	48.	220.	66.	303.	24.	178.
1/19/79	1745	20.5	8.2	11.5	50.	220.	70.	310.	25.	182.
1/19/79	1800	20.5	6.3	11.0	70.	218.	86.	267.	31.	157.
1/19/79	1815	20.5	7.0	12.3	58.	218.	75.	281.	27.	165.
1/19/79	1830	20.5	7.0	12.3	56.	222.	72.	286.	26.	168.
1/19/79	1845	20.5	6.8	11.8	56.	226.	71.	287.	25.	168.
1/19/79	1900	20.5	6.7	11.8	60.	229.	76.	289.	27.	169.
1/19/79	1915	20.5	6.6	11.8	64.	232.	80.	290.	29.	171.
1/19/79	1930	20.5	7.2	12.1	68.	240.	89.	314.	32.	184.
0/ 0/79	0	.0	.0	.0	0.	0.	0.	0.	0.	0.
1/19/79	2000	20.5	6.4	11.5	70.	240.	86.	296.	31.	174.
1/19/79	2015	20.5	6.6	12.3	75.	242.	94.	303.	34.	178.
1/19/79	2030	20.5	6.1	12.1	70.	245.	85.	296.	30.	174.
1/19/79	2045	20.5	6.6	12.1	60.	240.	75.	300.	27.	176.
1/19/79	2100	20.5	6.9	11.8	50.	230.	64.	294.	23.	173.
1/19/79	2115	20.5	6.7	11.8	50.	222.	63.	280.	23.	164.
1/19/79	2130	20.5	7.0	11.5	48.	220.	62.	283.	22.	166.
1/19/79	2145	20.5	7.3	11.5	48.	215.	63.	283.	23.	166.
1/19/79	2200	20.5	7.4	11.8	49.	215.	65.	285.	23.	167.
1/19/79	2215	20.5	6.5	11.5	80.	212.	99.	264.	36.	155.
1/19/79	2230	20.5	6.4	11.5	150.	210.	185.	259.	66.	152.
1/19/79	2245	20.5	7.3	12.3	65.	218.	86.	287.	31.	168.
1/19/79	2300	20.5	7.0	11.8	63.	218.	81.	281.	29.	165.
1/19/79	2315	20.5	7.3	11.3	60.	215.	79.	283.	28.	166.
1/19/79	2330	20.5	7.8	11.8	52.	230.	71.	314.	25.	185.
1/19/79	2345	20.5	7.3	11.3	58.	238.	76.	313.	27.	184.
1/19/79	2400	20.5	6.1	11.3	70.	230.	85.	278.	30.	163.

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**                                  15 MIN. DATA                                       **
**                          DRY STACK GAS CONCENTRATION                                **
**                                                                                     **
**                          O2      CO2     CO      NO      CO      NO      CO     NO  **
**                  LOAD    VOL%    VOL%    PPMV    PPMV    PPMV    PPMV    NG/J   NG/J **
**   DATE    TIME   MWTH    MEAS    MEAS    MEAS    MEAS    3%O2    3%O2               **
*****************************************************************************************
** 1/20/79   1215   20.5    7.0     11.5    60.     240.    77.     309.    28.    181. **
** 1/20/79   1230   20.5    6.7     11.5    50.     240.    63.     303.    23.    178. **
** 1/20/79   1245   20.5    6.7     12.1    50.     242.    63.     305.    23.    179. **
** 1/20/79   1300   19.9    6.9     11.8    48.     248.    61.     317.    22.    186. **
** 1/20/79   1315   19.9    7.0     12.1    49.     229.    63.     295.    23.    173. **
** 1/20/79   1330   19.9    7.2     12.3    46.     234.    60.     306.    21.    180. **
** 1/20/79   1345   19.9    6.6     11.8    49.     230.    61.     288.    22.    169. **
** 1/20/79   1400   20.5    7.0     12.1    42.     232.    54.     299.    19.    175. **
** 1/20/79   1415   20.5    7.5     11.0    40.     230.    53.     307.    19.    180. **
** 1/20/79   1430   20.5    7.5     10.8    40.     230.    53.     307.    19.    180. **
** 1/20/79   1445   20.5    8.5     11.3    42.     230.    61.     332.    22.    195. **
** 1/20/79   1500   20.5    6.9     11.5    60.     215.    77.     275.    27.    161. **
** 1/20/79   1515   20.5    7.4     11.8    80.     218.    106.    289.    38.    170. **
** 1/20/79   1530   20.5    7.4     11.8    45.     222.    60.     294.    21.    173. **
** 1/20/79   1545   20.5    7.3     11.5    60.     210.    79.     276.    28.    162. **
** 1/20/79   1600   20.5    7.9     11.8    70.     204.    96.     281.    34.    165. **
** 1/20/79   1615   20.5    8.7     11.5    55.     210.    81.     308.    29.    181. **
** 1/20/79   1630   20.5    7.7     11.3    65.     228.    88.     309.    32.    182. **
** 1/20/79   1645   20.5    7.6     10.5    74.     229.    100.    308.    36.    181. **
** 1/20/79   1700   20.5    7.3     11.3    75.     230.    99.     303.    35.    178. **
** 1/20/79   1715   20.5    7.4     11.0    60.     230.    80.     305.    28.    179. **
** 1/20/79   1730   20.5    7.7     11.5    54.     230.    73.     312.    26.    183. **
** 1/20/79   1745   20.5    7.6     11.5    50.     230.    67.     310.    24.    182. **
** 1/20/79   1800   20.5    7.8     11.3    48.     230.    66.     314.    23.    185. **
** 1/20/79   1815   20.5    7.7     11.5    48.     228.    65.     309.    23.    182. **
** 1/20/79   1830   20.5    7.5     11.3    48.     229.    64.     306.    23.    180. **
** 1/20/79   1845   20.5    7.3     11.3    48.     239.    63.     315.    23.    185. **
** 1/20/79   1900   20.5    6.7     11.5    54.     239.    68.     301.    24.    177. **
** 1/20/79   1915   20.5    6.9     11.5    60.     234.    77.     299.    27.    176. **
** 1/20/79   1930   20.5    7.5     11.8    80.     245.    107.    327.    38.    192. **
** 1/20/79   1945   20.5    7.4     12.1    80.     240.    106.    318.    38.    187. **
** 1/20/79   2000   21.1    7.4     11.8    70.     250.    93.     331.    33.    195. **
** 1/20/79   2015   21.1    8.7     11.5    65.     260.    95.     381.    34.    224. **
** 1/20/79   2030   21.1    8.4     11.8    59.     250.    84.     358.    30.    210. **
** 1/20/79   2045   21.1    8.3     11.5    54.     250.    77.     355.    27.    209. **
** 1/20/79   2100   19.9    8.1     11.0    45.     250.    63.     350.    22.    205. **
** 1/20/79   2115   19.9    7.7     11.0    45.     250.    61.     339.    22.    199. **
** 1/20/79   2130   19.9    7.6     11.0    60.     248.    81.     334.    29.    196. **
** 1/20/79   2145   19.9    7.3     11.0    70.     242.    92.     319.    33.    187. **
** 1/20/79   2200   20.5    7.6     11.3    80.     243.    108.    327.    38.    192. **
** 1/20/79   2215   20.5    8.1     11.3    120.    240.    168.    336.    60.    197. **
** 1/20/79   2230   20.5    8.1     11.5    58.     242.    81.     338.    29.    199. **
** 1/20/79   2245   20.5    8.2     11.3    52.     242.    73.     341.    26.    200. **
** 1/20/79   2300   20.5    8.7     11.0    42.     246.    62.     361.    22.    212. **
** 1/20/79   2315   20.5    8.5     11.3    50.     240.    72.     346.    26.    203. **
** 1/20/79   2330   20.5    9.0     10.8    42.     239.    63.     360.    23.    211. **
** 1/20/79   2345   20.5    9.4     11.0    40.     230.    62.     358.    22.    210. **
** 1/20/79   2400   20.5    8.3     10.5    46.     229.    65.     325.    23.    191. **
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**                                 15 MIN. DATA                                     **
**                          DRY STACK GAS CONCENTRATION                             **
**                                                                                  **
**                          O2     CO2     CO      NO      CO      NO     CO     NO **
**                   LOAD  VOL%   VOL%    PPMV    PPMV    PPMV    PPMV   NG/J   NG/J**
**   DATE     TIME   MWTH  MEAS   MEAS    MEAS    MEAS    3%O2    3%O2              **
**************************************************************************************
** 1/20/79      15   20.5   6.0   11.8    300.    208.    360.    250.   129.   147.  **
** 1/20/79      30   20.5   6.6   13.2     80.    230.    100.    288.    36.   169.  **
** 1/20/79      45   20.5   8.4   11.3     60.    220.     86.    315.    31.   185.  **
** 1/20/79     100   20.5   7.7   10.5     60.    220.     81.    298.    29.   175.  **
** 1/20/79     115   20.5   7.8   11.3     54.    220.     78.    301.    26.   176.  **
** 1/20/79     130   20.5   7.4   11.5     58.    222.     77.    294.    27.   173.  **
** 1/20/79     145   20.5   7.6   11.5     50.    228.     67.    307.    24.   180.  **
** 1/20/79     200   21.1   7.5   11.5     50.    230.     67.    307.    24.   180.  **
** 1/20/79     215   21.1   7.0   11.5     60.    225.     77.    290.    28.   170.  **
** 1/20/79     230   21.1   7.4   11.5     65.    230.     86.    305.    31.   179.  **
** 1/20/79     245   21.1   7.2   11.8     80.    230.    105.    301.    37.   176.  **
** 1/20/79     300   21.4   7.0   11.5     60.    225.     77.    290.    28.   170.  **
** 1/20/79     315   21.4   7.2   11.5     62.    220.     81.    287.    29.   169.  **
** 1/20/79     330   21.4   7.4   11.8     68.    212.     90.    281.    32.   165.  **
** 1/20/79     345   21.4   7.6   11.5     68.    218.     92.    293.    33.   172.  **
** 1/20/79     400   21.1   7.3   11.5     70.    210.     92.    276.    33.   162.  **
** 1/20/79     415   21.1   7.6   11.3     68.    210.     92.    283.    33.   166.  **
** 1/20/79     430   21.1   7.4   11.5     70.    218.     93.    289.    33.   170.  **
** 1/20/79     445   21.1   7.2   11.5     70.    215.     91.    281.    33.   165.  **
** 1/20/79     500   20.8   7.2   11.5     70.    220.     91.    287.    33.   169.  **
** 1/20/79     515   20.8   7.0   11.8     65.    218.     84.    281.    30.   165.  **
** 1/20/79     530   20.8   6.9   11.8     62.    218.     79.    279.    28.   164.  **
** 1/20/79     545   20.8   6.9   11.8     58.    210.     74.    268.    27.   158.  **
** 1/20/79     600   20.5   6.6   11.8     59.    218.     74.    273.    26.   160.  **
** 1/20/79     615   20.5   6.9   12.1     55.    220.     70.    281.    25.   165.  **
** 1/20/79     630   20.5   6.9   12.1     60.    220.     77.    281.    27.   165.  **
** 1/20/79     645   20.5   6.8   11.0     70.    228.     89.    289.    32.   170.  **
** 1/20/79     700   20.5   6.5   12.1    100.    220.    124.    273.    44.   161.  **
** 1/20/79     715   20.5   7.5   12.1     90.    224.    120.    299.    43.   176.  **
** 1/20/79     730   20.5   8.0   12.1     80.    226.    111.    314.    40.   184.  **
** 1/20/79     745   20.5   7.8   11.8     60.    229.     82.    313.    29.   184.  **
** 1/20/79     800   20.5   7.8   11.0     52.    226.     71.    309.    25.   181.  **
** 1/20/79     815   20.5   7.8   11.0     50.    229.     68.    313.    24.   184.  **
** 1/20/79     830   20.5   8.0   11.0     44.    229.     61.    318.    22.   187.  **
** 1/20/79     845   20.5   7.7   11.0     42.    226.     57.    306.    20.   180.  **
** 1/20/79     900   20.5   7.4   11.3     45.    220.     60.    292.    21.   171.  **
** 1/20/79     915   20.5   7.4   11.5     48.    224.     64.    297.    23.   174.  **
** 1/20/79     930   20.5   7.5   11.8     52.    228.     69.    305.    25.   179.  **
** 1/20/79     945   20.5   6.9   11.8     75.    217.     96.    277.    34.   163.  **
** 1/20/79    1000   20.5   7.5   11.5     90.    200.    120.    267.    43.   157.  **
** 1/20/79    1015   20.5   9.7   11.5     70.    230.    112.    368.    40.   216.  **
** 1/20/79    1030   20.5   7.2   11.0     50.    240.     65.    314.    23.   184.  **
** 1/20/79    1045   20.5   7.6   10.8     44.    240.     59.    323.    21.   190.  **
** 1/20/79    1100   22.0   7.4   11.3     42.    240.     56.    318.    20.   187.  **
** 1/20/79    1115   22.0   7.0   11.5     44.    240.     57.    309.    20.   181.  **
** 1/20/79    1130   22.0   7.4   11.5     50.    238.     66.    316.    24.   185.  **
** 1/20/79    1145   22.0   7.1   11.5     50.    237.     65.    307.    23.   180.  **
** 1/20/79    1200   20.5   7.4   11.8     54.    240.     72.    318.    26.   187.  **
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**                                      15 MIN. DATA                                       **
**                               DRY STACK GAS CONCENTRATION                               **
**                                                                                         **
**                             O2     CO2      CO      NO      CO      NO      CO      NO  **
**                  LOAD     VOL%    VOL%    PPMV    PPMV    PPMV    PPMV    NG/J    NG/J  **
**     DATE   TIME  MWTH     MEAS    MEAS    MEAS    MEAS    3%O2    3%O2                  **
*********************************************************************************************
**  1/21/79   1215   22.0    -1.0      .0     -1.     -1.     -1.     -1.     -1.     -1.  **
**  1/21/79   1230   22.0     8.1      .0     -1.    230.     -1.    322.     -1.    189.  **
**  1/21/79   1245   22.0     7.9      .0     -1.    238.     -1.    328.     -1.    192.  **
**  1/21/79   1300   22.0     7.1    11.8     56.    234.     73.    304.     26.    178.  **
**  1/21/79   1315   22.0     7.1    11.8     58.    232.     75.    301.     27.    177.  **
**  1/21/79   1330   22.0     6.9    12.1     60.    234.     77.    299.     27.    176.  **
**  1/21/79   1345   22.0     7.0    11.8     42.    232.     54.    299.     19.    175.  **
**  1/21/79   1400   22.6     7.0    11.0     42.    233.     54.    300.     19.    176.  **
**  1/21/79   1415   22.6     8.0    11.0     48.    210.     67.    291.     24.    171.  **
**  1/21/79   1430   22.6     7.8    10.5     70.    220.     96.    301.     34.    176.  **
**  1/21/79   1445   22.6     8.4    12.3     54.    200.     77.    286.     28.    168.  **
**  1/21/79   1500   20.5     6.6    11.8     52.    220.     65.    275.     23.    162.  **
**  1/21/79   1515   20.5     8.5    10.0     60.    232.     87.    335.     31.    197.  **
**  1/21/79   1530   20.5     8.5    10.3     58.    238.     84.    344.     30.    202.  **
**  1/21/79   1545   20.5     6.5    11.8     54.    234.     67.    291.     24.    171.  **
**  1/21/79   1600   20.5     7.5    11.3     52.    242.     69.    323.     25.    190.  **
**  1/21/79   1615   20.5     7.2    11.3     53.    244.     69.    319.     25.    187.  **
**  1/21/79   1630   20.5     7.7    11.3     53.    242.     72.    328.     26.    193.  **
**  1/21/79   1645   20.5     7.5    11.5     59.    244.     79.    326.     28.    191.  **
**  1/21/79   1700   21.7     7.7    11.3     52.    240.     71.    325.     25.    191.  **
**  1/21/79   1715   21.7     7.4    11.5     52.    239.     69.    317.     25.    186.  **
**  1/21/79   1730   21.7     7.3    11.5     51.    239.     67.    315.     24.    185.  **
**  1/21/79   1745   21.7     7.4    11.5     51.    239.     68.    317.     24.    186.  **
**  1/21/79   1800   21.1     7.6    11.3     50.    238.     67.    320.     24.    188.  **
**  1/21/79   1815   21.1     7.6    11.5     50.    234.     67.    315.     24.    185.  **
**  1/21/79   1830   21.1     7.5    11.5     50.    232.     67.    310.     24.    182.  **
**  1/21/79   1845   21.1     7.6    11.3     49.    232.     66.    312.     24.    183.  **
**  1/21/79   1900   21.4     7.7    11.3     50.    230.     68.    312.     24.    183.  **
**  1/21/79   1915   21.4     7.5    11.5     50.    229.     67.    306.     24.    180.  **
**  1/21/79   1930   21.4     7.3    11.5     50.    231.     66.    304.     24.    179.  **
**  1/21/79   1945   21.4     7.4    11.5     50.    234.     66.    310.     24.    182.  **
**  1/21/79   2000   20.8     7.4    11.5     55.    237.     73.    314.     26.    185.  **
**  1/21/79   2015   20.8     7.6    11.5     55.    238.     74.    320.     26.    188.  **
**  1/21/79   2030   20.8     7.8    11.5     54.    248.     74.    339.     26.    199.  **
**  1/21/79   2045   20.8     7.4    11.5     54.    243.     72.    322.     26.    189.  **
**  1/21/79   2100   20.5     7.4    11.5     60.    246.     80.    326.     28.    192.  **
**  1/21/79   2115   20.5     7.3    11.5     58.    245.     76.    322.     27.    189.  **
**  1/21/79   2130   20.5     7.3    11.5     44.    249.     58.    328.     21.    192.  **
**  1/21/79   2145   20.5     7.2    11.5     48.    248.     63.    328.     22.    190.  **
**  1/21/79   2200   20.5     7.4    11.5     48.    241.     64.    320.     23.    188.  **
**  1/21/79   2215   20.5     7.5    11.5     47.    240.     63.    321.     22.    188.  **
**  1/21/79   2230   20.5     7.4    11.5     47.    241.     62.    320.     22.    188.  **
**  1/21/79   2245   20.5     7.2    11.8     66.    238.     86.    311.     31.    183.  **
**  1/21/79   2300   20.5     6.9    12.1    200.    230.    256.    294.     91.    173.  **
**  1/21/79   2315   20.5     6.8    12.3    200.    231.    254.    293.     91.    172.  **
**  1/21/79   2330   20.5     6.6    12.3    200.    231.    250.    289.     89.    170.  **
**  1/21/79   2345   20.5     6.5    12.3    180.    225.    224.    280.     80.    164.  **
**  1/21/79   2400   20.8     6.7    12.3    110.    228.    139.    287.     50.    169.  **
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15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
1/21/79	15	20.5	9.5	10.3	50.	235.	79.	369.	28.	217.
1/21/79	30	20.5	9.9	10.0	50.	240.	81.	391.	29.	229.
1/21/79	45	20.5	8.9	9.8	50.	240.	75.	358.	27.	210.
1/21/79	100	20.5	8.5	9.6	50.	249.	72.	359.	26.	211.
1/21/79	115	20.5	8.0	11.0	50.	248.	69.	344.	25.	202.
1/21/79	130	20.5	7.8	10.5	50.	250.	68.	342.	24.	201.
1/21/79	145	20.5	8.3	11.0	50.	256.	71.	364.	25.	214.
1/21/79	200	18.8	7.5	11.5	40.	250.	53.	334.	19.	196.
1/21/79	215	18.8	8.3	11.0	42.	250.	60.	355.	21.	209.
1/21/79	230	18.8	8.5	11.3	44.	254.	64.	367.	23.	215.
1/21/79	245	18.8	8.3	11.3	48.	254.	68.	361.	24.	212.
1/21/79	300	21.4	8.0	11.0	49.	246.	68.	341.	24.	200.
1/21/79	315	21.4	8.0	10.8	50.	242.	69.	336.	25.	197.
1/21/79	330	21.4	9.0	11.0	50.	240.	75.	361.	27.	212.
1/21/79	345	21.4	8.8	11.0	50.	240.	74.	355.	26.	208.
1/21/79	400	20.5	8.0	11.0	55.	240.	76.	333.	27.	196.
1/21/79	415	20.5	7.4	10.5	55.	239.	73.	317.	26.	186.
1/21/79	430	20.5	6.9	10.5	55.	235.	70.	300.	25.	176.
1/21/79	445	20.5	10.0	11.3	190.	238.	312.	391.	112.	229.
1/21/79	500	20.5	6.7	12.1	44.	240.	55.	303.	20.	178.
1/21/79	515	20.5	8.6	10.0	300.	240.	437.	349.	156.	205.
1/21/79	530	20.5	9.4	11.3	40.	235.	62.	366.	22.	215.
1/21/79	545	20.5	9.9	12.3	40.	236.	65.	384.	23.	225.
1/21/79	600	23.4	9.9	10.0	44.	238.	72.	387.	26.	227.
1/21/79	615	23.4	9.0	.0	-1.	238.	-1.	358.	-1.	210.
1/21/79	630	23.4	8.1	.0	-1.	238.	-1.	333.	-1.	195.
1/21/79	645	23.4	7.7	.0	-1.	238.	-1.	323.	-1.	189.
1/21/79	700	20.5	7.6	.0	-1.	232.	-1.	312.	-1.	183.
1/21/79	715	20.5	7.8	.0	-1.	234.	-1.	320.	-1.	188.
1/21/79	730	20.5	8.1	.0	-1.	242.	-1.	338.	-1.	199.
1/21/79	745	20.5	8.0	.0	-1.	244.	-1.	339.	-1.	199.
1/21/79	800	20.5	8.0	.0	-1.	242.	-1.	336.	-1.	197.
1/21/79	815	20.5	7.9	.0	-1.	243.	-1.	335.	-1.	196.
1/21/79	830	20.5	7.9	.0	-1.	243.	-1.	335.	-1.	196.
1/21/79	845	20.5	7.9	.0	-1.	243.	-1.	335.	-1.	196.
1/21/79	900	21.1	7.8	.0	-1.	240.	-1.	328.	-1.	193.
1/21/79	915	21.1	7.7	.0	-1.	239.	-1.	324.	-1.	190.
1/21/79	930	21.1	7.4	.0	-1.	232.	-1.	308.	-1.	181.
1/21/79	945	21.1	7.5	.0	-1.	232.	-1.	310.	-1.	182.
1/21/79	1000	21.1	8.1	.0	-1.	232.	-1.	324.	-1.	190.
1/21/79	1015	21.1	8.2	.0	-1.	210.	-1.	296.	-1.	174.
1/21/79	1030	21.1	8.5	.0	-1.	228.	-1.	329.	-1.	193.
1/21/79	1045	21.1	8.3	.0	-1.	232.	-1.	330.	-1.	194.
1/21/79	1100	22.0	7.6	.0	-1.	232.	-1.	312.	-1.	183.
1/21/79	1115	21.1	7.3	.0	-1.	238.	-1.	313.	-1.	184.
1/21/79	1130	22.0	7.0	.0	-1.	238.	-1.	306.	-1.	180.
1/21/79	1145	21.1	6.7	.0	-1.	238.	-1.	300.	-1.	176.
1/21/79	1200	22.0	6.7	.0	-1.	238.	-1.	300.	-1.	176.

15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
1/22/79	15	20.8	6.6	12.3	70.	240.	88.	300.	31.	176.
1/22/79	30	20.8	6.7	12.3	60.	239.	76.	301.	27.	177.
1/22/79	45	20.8	6.7	12.3	48.	236.	61.	297.	22.	175.
1/22/79	100	20.8	7.0	12.1	44.	250.	57.	322.	20.	189.
1/22/79	115	20.8	7.0	12.1	46.	250.	59.	322.	21.	189.
1/22/79	130	20.8	7.0	12.1	42.	250.	54.	322.	19.	189.
1/22/79	145	20.8	7.1	12.1	42.	250.	54.	324.	19.	190.
1/22/79	200	20.5	7.1	12.1	44.	250.	57.	324.	20.	190.
1/22/79	215	20.5	6.8	12.1	70.	250.	89.	317.	32.	186.
1/22/79	230	20.5	6.6	12.3	72.	244.	90.	305.	32.	179.
1/22/79	245	20.5	6.9	12.1	41.	242.	52.	309.	19.	182.
1/22/79	300	20.5	8.6	11.0	41.	240.	60.	349.	21.	205.
1/22/79	315	20.5	8.7	10.8	44.	240.	65.	352.	23.	207.
1/22/79	330	20.5	9.3	10.5	41.	244.	63.	377.	23.	221.
1/22/79	345	20.5	8.2	10.0	42.	242.	59.	341.	21.	200.
1/22/79	400	20.5	8.1	11.0	41.	240.	57.	336.	20.	197.
1/22/79	415	20.5	8.1	11.0	42.	244.	59.	341.	21.	200.
1/22/79	430	20.5	8.1	11.0	60.	240.	84.	336.	30.	197.
1/22/79	445	20.5	8.0	11.0	60.	242.	83.	336.	30.	197.
1/22/79	500	20.8	7.8	11.3	60.	242.	82.	331.	29.	194.
1/22/79	515	20.8	7.9	11.3	58.	248.	80.	341.	29.	200.
1/22/79	530	20.8	8.1	11.3	41.	248.	57.	347.	20.	204.
1/22/79	545	20.8	8.1	11.3	48.	244.	67.	341.	24.	200.
1/22/79	600	20.5	8.1	11.3	47.	242.	66.	338.	23.	199.
1/22/79	615	20.5	8.0	11.3	50.	242.	69.	336.	25.	197.
1/22/79	630	20.5	7.9	11.3	50.	241.	69.	332.	25.	195.
1/22/79	645	20.5	7.8	11.3	58.	241.	79.	329.	28.	193.
1/22/79	700	20.5	7.7	11.3	60.	241.	81.	327.	29.	192.
1/22/79	715	20.5	7.5	11.5	65.	241.	87.	322.	31.	189.
1/22/79	730	20.5	7.8	11.5	52.	239.	71.	327.	25.	192.
1/22/79	745	20.5	7.6	11.5	100.	240.	135.	323.	48.	190.
1/22/79	800	20.5	7.7	11.5	100.	234.	136.	317.	48.	186.
1/22/79	815	20.5	7.8	11.5	60.	239.	82.	327.	29.	192.
1/22/79	830	20.5	7.6	11.3	44.	234.	59.	315.	21.	185.
1/22/79	845	20.5	8.2	11.5	42.	230.	59.	324.	21.	190.
1/22/79	900	20.5	7.9	11.3	41.	231.	56.	318.	20.	187.
1/22/79	915	20.5	8.0	11.3	42.	232.	58.	322.	21.	189.
1/22/79	930	20.5	8.4	11.3	42.	231.	60.	331.	21.	194.
1/22/79	945	20.5	8.6	11.3	42.	234.	61.	341.	22.	200.
1/22/79	1000	20.5	8.7	11.3	40.	239.	59.	351.	21.	206.
1/22/79	1015	20.5	8.4	10.8	40.	238.	57.	341.	20.	200.
1/22/79	1030	20.5	8.0	10.8	40.	237.	56.	329.	20.	193.
1/22/79	1045	20.5	7.5	11.0	40.	238.	53.	318.	19.	187.
1/22/79	1100	20.5	8.0	11.3	46.	240.	64.	333.	23.	196.
1/22/79	1115	20.5	8.0	10.3	40.	238.	56.	330.	20.	194.
1/22/79	1130	20.5	8.5	10.8	42.	239.	61.	345.	22.	203.
1/22/79	1145	20.5	8.7	10.0	44.	240.	65.	352.	23.	207.
1/22/79	1200	22.3	7.8	10.5	46.	228.	63.	312.	22.	183.

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**                                  15 MIN, DATA                                        **
**                           DRY STACK GAS CONCENTRATION                                **
**                                                                                      **
**                            O2      CO2     CO      NO      CO      NO      CO     NO  **
**                    LOAD    VOL%    VOL%    PPMV    PPMV    PPMV    PPMV    NG/J   NG/J **
**    DATE     TIME   MWTH    MEAS    MEAS    MEAS    MEAS    3%O2    3%O2              **
******************************************************************************************
** 1/22/79    1215    22.3    8.3    11.0     59.    232.     84.    330.     30.   194.   **
** 1/22/79    1230    22.3    7.2    10.5     60.    239.     78.    312.     28.   183.   **
** 1/22/79    1245    22.3    7.3    11.5     52.    239.     68.    315.     24.   185.   **
** 1/22/79    1300    20.5    7.8    11.3     44.    240.     60.    328.     21.   193.   **
** 1/22/79    1315    20.5    7.8    11.0     45.    240.     61.    328.     22.   193.   **
** 1/22/79    1330    20.5    7.7    11.0     45.    240.     61.    325.     22.   191.   **
** 1/22/79    1345    20.5    7.7    11.0     44.    240.     60.    325.     21.   191.   **
** 1/22/79    1400    21.7    7.6    11.0     43.    238.     58.    320.     21.   188.   **
** 1/22/79    1415    21.7    7.8    11.0     44.    230.     60.    314.     21.   185.   **
** 1/22/79    1430    21.7    7.0    10.8     42.    230.     54.    296.     19.   174.   **
** 1/22/79    1445    21.7    7.2    11.5     42.    230.     55.    301.     20.   176.   **
** 1/22/79    1500    22.0    7.2    11.5     42.    229.     55.    299.     20.   176.   **
** 1/22/79    1515    22.0    7.3    11.5     42.    229.     55.    301.     20.   177.   **
** 1/22/79    1530    22.0    7.2    11.5     45.    230.     59.    301.     21.   176.   **
** 1/22/79    1545    22.0    7.2    11.5     47.    228.     61.    298.     22.   175.   **
** 1/22/79    1600    20.5    7.1    11.5     44.    230.     57.    298.     20.   175.   **
** 1/22/79    1615    20.5    7.2    11.5     48.    238.     63.    311.     22.   183.   **
** 1/22/79    1630    20.5    7.0    11.5     49.    238.     63.    306.     23.   180.   **
** 1/22/79    1645    20.5    6.3    11.5     55.    230.     67.    282.     24.   166.   **
** 1/22/79    1700    20.5    6.5    12.3     50.    232.     62.    288.     22.   169.   **
** 1/22/79    1715    20.5    6.5    11.8     50.    244.     62.    303.     22.   178.   **
** 1/22/79    1730    20.5    6.6    12.1     46.    240.     58.    300.     21.   176.   **
** 1/22/79    1745    20.5    7.1    12.3     44.    240.     57.    311.     20.   183.   **
** 1/22/79    1800    20.5    7.3    11.5     45.    248.     59.    326.     21.   192.   **
** 1/22/79    1815    20.5    6.1    11.3     44.    250.     53.    302.     19.   178.   **
** 1/22/79    1830    20.5    6.0    12.3     42.    250.     50.    300.     18.   176.   **
** 1/22/79    1845    20.5    6.3    12.6     42.    249.     51.    305.     18.   179.   **
** 1/22/79    1900    20.5    6.4    12.3     43.    244.     53.    301.     19.   177.   **
** 1/22/79    1915    20.5    6.7    12.3     41.    244.     52.    308.     18.   181.   **
** 1/22/79    1930    20.5    6.6    12.1     42.    244.     53.    305.     19.   179.   **
** 1/22/79    1945    20.5    7.0    12.3     38.    242.     49.    312.     17.   183.   **
** 1/22/79    2000    20.5    6.5    11.8     38.    234.     47.    291.     17.   171.   **
** 1/22/79    2015    20.5    6.8    12.3     40.    235.     51.    298.     18.   175.   **
** 1/22/79    2030    20.5    6.7    12.1     40.    232.     50.    292.     18.   172.   **
** 1/22/79    2045    20.5    6.7    12.1     40.    232.     50.    292.     18.   172.   **
** 1/22/79    2100    20.5    6.3    12.1     40.    238.     49.    292.     18.   171.   **
** 1/22/79    2115    20.5    6.8    12.3     39.    234.     50.    297.     18.   174.   **
** 1/22/79    2130    20.5    7.0    12.1     38.    230.     49.    296.     17.   174.   **
** 1/22/79    2145    20.5    7.0    11.8     42.    228.     54.    294.     19.   172.   **
** 1/22/79    2200    20.5    6.6    11.5     44.    229.     55.    287.     20.   168.   **
** 1/22/79    2215    20.5    7.2    12.1     42.    220.     55.    287.     20.   169.   **
** 1/22/79    2230    20.5    7.3    11.8     44.    218.     58.    287.     21.   168.   **
** 1/22/79    2245    20.5    7.4    11.3     65.    214.     86.    284.     31.   167.   **
** 1/22/79    2300    20.5    7.7    11.5     45.    218.     61.    296.     22.   174.   **
** 1/22/79    2315    20.5    7.5    11.0     42.    218.     56.    291.     20.   171.   **
** 1/22/79    2330    20.5    7.7    11.3     41.    220.     56.    298.     20.   175.   **
** 1/22/79    2345    20.5    7.9    11.0     38.    200.     52.    275.     19.   162.   **
** 1/22/79    2400    20.5    8.5    11.0     45.    204.     65.    294.     23.   173.   **
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15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
1/23/79	15	20.5	9.0	10.5	42.	200.	63.	301.	23.	177.
1/23/79	30	20.5	9.2	9.6	43.	190.	66.	291.	24.	171.
1/23/79	45	20.5	9.2	9.8	43.	190.	66.	291.	24.	171.
1/23/79	100	20.5	9.5	9.8	44.	184.	69.	289.	25.	170.
1/23/79	115	20.5	9.7	9.3	45.	182.	72.	291.	26.	171.
1/23/79	130	20.5	9.8	9.3	52.	182.	84.	293.	30.	172.
1/23/79	145	20.5	9.9	9.1	51.	182.	83.	296.	30.	174.
1/23/79	200	21.1	10.0	8.9	48.	182.	79.	299.	28.	175.
1/23/79	215	21.1	10.0	8.7	49.	182.	80.	299.	29.	175.
1/23/79	230	21.1	10.0	8.7	48.	199.	79.	327.	28.	192.
1/23/79	245	21.1	10.0	8.9	49.	210.	80.	345.	29.	202.
1/23/79	300	21.4	8.5	8.7	52.	228.	75.	329.	27.	193.
1/23/79	315	21.4	7.4	9.8	54.	228.	72.	302.	26.	177.
1/23/79	330	21.4	7.0	11.0	55.	226.	71.	291.	25.	171.
1/23/79	345	21.4	7.4	11.3	55.	230.	73.	305.	26.	179.
1/23/79	400	21.7	7.1	11.8	55.	228.	71.	296.	25.	174.
1/23/79	415	21.7	7.0	11.3	60.	229.	77.	295.	28.	173.
1/23/79	430	21.7	7.0	11.5	60.	228.	77.	294.	28.	172.
1/23/79	445	21.7	7.4	11.8	60.	224.	80.	297.	28.	174.
1/23/79	500	20.5	7.1	11.8	49.	229.	64.	297.	23.	174.
1/23/79	515	20.5	7.1	11.5	49.	232.	64.	301.	23.	177.
1/23/79	530	20.5	7.4	11.5	47.	232.	62.	308.	22.	181.
1/23/79	545	20.5	7.3	11.5	54.	234.	71.	308.	25.	181.
1/23/79	600	20.8	7.3	11.5	60.	234.	79.	308.	28.	181.
1/23/79	615	20.8	7.5	11.3	55.	238.	73.	318.	26.	187.
1/23/79	630	20.8	7.2	11.3	54.	242.	71.	316.	25.	186.
1/23/79	645	20.8	7.3	11.3	48.	239.	63.	315.	23.	185.
1/23/79	700	20.5	7.0	11.5	44.	240.	57.	309.	20.	181.
1/23/79	715	20.5	6.9	11.5	44.	239.	56.	306.	20.	179.
1/23/79	730	20.5	6.9	11.8	44.	239.	56.	306.	20.	179.
1/23/79	745	20.5	7.2	11.8	42.	238.	55.	311.	20.	183.
1/23/79	800	20.5	7.1	11.5	40.	242.	52.	314.	19.	184.
1/23/79	815	20.5	10.0	11.5	42.	164.	69.	269.	25.	158.
1/23/79	830	20.5	10.0	11.5	100.	170.	164.	279.	59.	164.
1/23/79	845	20.5	10.0	12.1	105.	169.	172.	278.	62.	163.
1/23/79	900	20.5	10.0	8.9	65.	175.	107.	287.	38.	169.
1/23/79	915	20.5	10.0	8.7	80.	178.	131.	292.	47.	172.
1/23/79	930	20.5	10.0	8.7	35.	180.	57.	296.	21.	174.
1/23/79	945	20.5	10.0	8.3	60.	180.	99.	296.	35.	174.
1/23/79	1000	20.5	10.0	8.3	65.	180.	107.	296.	38.	174.
1/23/79	1015	20.5	7.2	8.7	45.	249.	59.	325.	21.	191.
1/23/79	1030	20.5	7.3	.0	-1.	245.	-1.	322.	-1.	189.
1/23/79	1045	20.5	7.9	11.5	38.	242.	52.	333.	19.	196.
1/23/79	1100	20.5	8.1	11.5	38.	220.	53.	308.	19.	181.
1/23/79	1115	20.5	9.2	11.5	38.	245.	58.	375.	21.	220.
1/23/79	1130	20.5	8.6	11.0	50.	248.	73.	361.	26.	212.
1/23/79	1145	20.5	7.2	10.3	40.	248.	52.	324.	19.	190.
1/23/79	1200	20.5	7.2	10.8	50.	239.	65.	312.	23.	183.

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**                                    15 MIN. DATA                                    **
**                            DRY STACK GAS CONCENTRATION                             **
**                                                                                    **
**                             O2     CO2     CO      NO      CO      NO     CO     NO   **
**                    LOAD    VOL%    VOL%   PPMV    PPMV    PPMV    PPMV   NG/J   NG/J  **
**   DATE     TIME    MWTH    MEAS    MEAS   MEAS    MEAS    3%O2    3%O2              **
****************************************************************************************
** 1/23/79    1215    20.5    7.7     11.8    38.    238.    52.    323.    18.    189.   **
** 1/23/79    1230    20.5    8.2     11.8    42.    238.    59.    335.    21.    197.   **
** 1/23/79    1245    20.5    8.0     11.3    38.    242.    53.    336.    19.    197.   **
** 1/23/79    1300    17.6    7.4     11.0    39.    240.    52.    318.    18.    187.   **
** 1/23/79    1315    17.6    7.5     11.0    42.    250.    56.    334.    20.    196.   **
** 1/23/79    1330    17.6    9.1     11.5    48.    260.    73.    394.    26.    232.   **
** 1/23/79    1345    17.6    7.5     11.8    42.    260.    56.    347.    20.    204.   **
** 1/23/79    1400    16.1    7.5     10.3    45.    258.    60.    345.    21.    202.   **
** 1/23/79    1415    16.1    7.4     11.5    44.    256.    58.    339.    21.    199.   **
** 1/23/79    1430    16.1    7.3     11.5    52.    256.    68.    337.    24.    198.   **
** 1/23/79    1445    16.1    7.3     11.5    40.    255.    53.    336.    19.    197.   **
** 1/23/79    1500    16.1    7.2     11.5    45.    253.    59.    331.    21.    194.   **
** 1/23/79    1515    16.1    8.0     11.5    45.    250.    62.    347.    22.    204.   **
** 1/23/79    1530    16.1    7.6     11.5    38.    242.    51.    326.    18.    191.   **
** 1/23/79    1545    16.1    6.9     11.5    36.    234.    46.    299.    16.    176.   **
** 1/23/79    1600    20.5    6.5     10.8    70.    232.    87.    288.    31.    169.   **
** 1/23/79    1615    20.5    6.9     11.5   120.    232.   153.    297.    55.    174.   **
** 1/23/79    1630    20.5    7.4     12.3   100.    234.   133.    310.    47.    182.   **
** 1/23/79    1645    20.5    7.4     12.1    80.    235.   106.    312.    38.    183.   **
** 1/23/79    1700    20.5    7.8     11.5    80.    239.   109.    327.    39.    192.   **
** 1/23/79    1715    20.5    7.0     11.5    70.    240.    90.    309.    32.    181.   **
** 1/23/79    1730    20.5    6.9     11.0   150.    240.   192.    307.    69.    180.   **
** 1/23/79    1745    20.5    7.2     12.1    68.    240.    89.    314.    32.    184.   **
** 1/23/79    1800    20.5    7.4     11.8    46.    245.    61.    325.    22.    191.   **
** 1/23/79    1815    20.5    7.3     11.8    42.    246.    55.    324.    20.    190.   **
** 1/23/79    1830    20.5    7.3     11.5    42.    244.    55.    321.    20.    189.   **
** 1/23/79    1845    20.5    7.4     11.0    44.    244.    58.    324.    21.    190.   **
** 1/23/79    1900    20.5    7.5     11.8    42.    244.    56.    328.    20.    191.   **
** 1/23/79    1915    20.5    7.6     11.8    44.    249.    59.    335.    21.    197.   **
** 1/23/79    1930    20.5    7.6     11.5    42.    250.    57.    336.    20.    198.   **
** 1/23/79    1945    20.5    7.5     11.5    42.    250.    56.    334.    20.    196.   **
** 1/23/79    2000    20.5    7.4     11.3    41.    250.    54.    331.    19.    195.   **
** 1/23/79    2015    20.5    7.6     11.5    40.    252.    54.    339.    19.    199.   **
** 1/23/79    2030    20.5    7.5     11.5    38.    250.    51.    334.    18.    196.   **
** 1/23/79    2045    20.5    7.5     11.5    37.    248.    49.    331.    18.    195.   **
** 1/23/79    2100    20.5    7.3     11.5    36.    242.    47.    319.    17.    187.   **
** 1/23/79    2115    20.5    7.4     11.5    37.    242.    49.    321.    18.    188.   **
** 1/23/79    2130    20.5    7.2     11.5    40.    242.    52.    316.    19.    186.   **
** 1/23/79    2145    20.5    7.4     11.8    40.    242.    53.    321.    19.    188.   **
** 1/23/79    2200    20.5    7.6     11.8    40.    242.    54.    326.    19.    191.   **
** 1/23/79    2215    20.5    7.1     11.8    40.    240.    52.    311.    19.    183.   **
** 1/23/79    2230    20.5    7.2     11.5    44.    235.    57.    307.    21.    180.   **
** 1/23/79    2245    20.5    7.3     11.5    42.    238.    55.    313.    20.    184.   **
** 1/23/79    2300    20.5    7.3     11.8    44.    235.    58.    309.    21.    182.   **
** 1/23/79    2315    20.5    7.2     11.8    45.    238.    59.    311.    21.    183.   **
** 1/23/79    2330    20.5    7.1     11.8    50.    235.    65.    305.    23.    179.   **
** 1/23/79    2345    20.5    7.0     11.8    50.    235.    64.    303.    23.    178.   **
** 1/23/79    2400    20.5    7.0     12.1    49.    225.    63.    290.    23.    170.   **
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15 MIN. DATA

DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
1/24/79	15	20.5	7.3	11.8	49.	240.	64.	316.	23.	185.
1/24/79	30	20.5	7.4	12.1	50.	240.	66.	318.	24.	187.
1/24/79	45	20.5	7.3	12.1	50.	240.	66.	316.	24.	185.
1/24/79	100	20.5	7.3	11.5	42.	240.	55.	316.	20.	185.
1/24/79	115	20.5	7.3	11.8	42.	240.	55.	316.	20.	185.
1/24/79	130	20.5	7.3	11.8	42.	242.	55.	319.	20.	187.
1/24/79	145	20.5	7.1	11.8	42.	245.	54.	318.	19.	187.
1/24/79	200	20.5	7.1	12.1	42.	241.	54.	313.	19.	184.
1/24/79	215	20.5	7.3	12.1	44.	242.	58.	319.	21.	187.
1/24/79	230	20.5	7.3	12.1	44.	242.	58.	319.	21.	187.
1/24/79	245	20.5	7.4	11.8	44.	240.	58.	318.	21.	187.
1/24/79	300	20.5	7.4	11.8	44.	238.	58.	316.	21.	185.
1/24/79	315	20.5	7.7	11.8	46.	232.	62.	315.	22.	185.
1/24/79	330	20.5	8.0	11.8	42.	210.	58.	291.	21.	171.
1/24/79	345	20.5	9.0	11.3	42.	215.	63.	323.	23.	190.
1/24/79	400	20.5	9.3	10.8	42.	210.	65.	324.	23.	190.
1/24/79	415	20.5	8.9	10.0	46.	208.	69.	310.	25.	182.
1/24/79	430	20.5	8.8	10.5	51.	202.	75.	299.	27.	175.
1/24/79	445	20.5	8.8	10.5	75.	194.	111.	287.	40.	169.
1/24/79	500	20.5	9.0	10.5	66.	191.	99.	287.	35.	169.
1/24/79	515	20.5	9.3	10.3	70.	184.	108.	284.	39.	167.
1/24/79	530	20.5	9.3	10.3	70.	180.	108.	278.	39.	163.
1/24/79	545	20.5	9.5	10.0	80.	178.	126.	279.	45.	164.
1/24/79	600	21.7	9.8	10.0	70.	170.	113.	274.	40.	161.
1/24/79	615	21.7	9.8	9.8	65.	169.	105.	273.	37.	160.
1/24/79	630	21.7	9.8	9.6	62.	165.	100.	266.	36.	156.
1/24/79	645	21.7	9.9	9.6	62.	160.	101.	260.	36.	153.
1/24/79	700	22.9	9.9	9.6	90.	159.	146.	259.	52.	152.
1/24/79	715	22.9	-1.0	9.6	39.	-1.	33.	-1.	12.	-1.
1/24/79	730	22.9	-1.0	9.1	34.	-1.	29.	-1.	10.	-1.
1/24/79	745	22.9	-1.0	8.9	32.	-1.	27.	-1.	10.	-1.
1/24/79	800	21.1	-1.0	8.7	32.	-1.	27.	-1.	10.	-1.
1/24/79	815	21.1	-1.0	8.7	31.	-1.	26.	-1.	9.	-1.
1/24/79	830	21.1	-1.0	8.7	34.	-1.	29.	-1.	10.	-1.
1/24/79	845	21.1	-1.0	8.7	34.	-1.	29.	-1.	10.	-1.
1/24/79	900	22.0	-1.0	8.7	35.	-1.	30.	-1.	11.	-1.
1/24/79	915	22.0	-1.0	9.1	39.	-1.	33.	-1.	12.	-1.
1/24/79	930	22.0	-1.0	9.1	38.	-1.	32.	-1.	12.	-1.
1/24/79	945	22.0	-1.0	8.9	39.	-1.	33.	-1.	12.	-1.
1/24/79	1000	21.4	-1.0	9.1	50.	-1.	43.	-1.	15.	-1.
1/24/79	1015	21.4	-1.0	8.9	39.	-1.	33.	-1.	12.	-1.
1/24/79	1030	21.4	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
1/24/79	1045	21.4	7.5	.0	-1.	240.	-1.	321.	-1.	188.
1/24/79	1100	20.5	7.3	11.5	100.	225.	132.	296.	47.	178.
1/24/79	1115	20.5	8.0	11.5	90.	245.	125.	340.	45.	200.
1/24/79	1130	20.5	7.0	11.8	80.	245.	103.	316.	37.	185.
1/24/79	1145	20.5	7.4	10.8	80.	245.	106.	325.	38.	191.
1/24/79	1200	21.1	7.8	12.1	65.	245.	89.	335.	32.	197.

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**                                      15 MIN. DATA                                            **
**                              DRY STACK GAS CONCENTRATION                                     **
**                                                                                              **
**                           O2      CO2      CO       NO       CO       NO       CO      NO    **
**                   LOAD    VOL%    VOL%     PPMV     PPMV     PPMV     PPMV     NG/J    NG/J  **
**   DATE     TIME   MWTH    MEAS    MEAS     MEAS     MEAS     3%O2     3%O2                   **
**************************************************************************************************
** 1/24/79    1215   21.1     8.3    11.3     50.      242.     71.      344.     25.     202.  **
** 1/24/79    1230   21.1     8.5    11.0     44.      250.     64.      361.     23.     212.  **
** 1/24/79    1245   21.1     7.8    10.8     48.      245.     66.      335.     23.     197.  **
** 1/24/79    1300   20.8     7.5    11.0     40.      248.     53.      331.     19.     195.  **
** 1/24/79    1315   20.8     7.3    11.0     44.      249.     58.      328.     21.     192.  **
** 1/24/79    1330   20.8     7.7    11.5     42.      242.     57.      328.     20.     193.  **
** 1/24/79    1345   20.8     7.7    11.5     42.      249.     57.      338.     20.     198.  **
** 1/24/79    1400   20.8     7.1    11.3     60.      244.     78.      316.     28.     186.  **
** 1/24/79    1415   20.8     8.0    11.5     50.      235.     69.      326.     25.     191.  **
** 1/24/79    1430   20.8     7.5    10.5     60.      242.     80.      323.     29.     190.  **
** 1/24/79    1445   20.8     8.0    11.3     60.      238.     83.      330.     30.     194.  **
** 1/24/79    1500   20.8     7.8    11.5     65.      242.     89.      331.     32.     198.  **
** 1/24/79    1515   20.8     7.5    11.5     50.      244.     67.      326.     24.     191.  **
** 1/24/79    1530   20.8     7.4    11.3     70.      240.     93.      318.     33.     187.  **
** 1/24/79    1545   20.8     7.1    11.5     70.      245.     91.      318.     32.     187.  **
** 1/24/79    1600   20.8     7.1    11.8     50.      249.     65.      323.     23.     190.  **
** 1/24/79    1615   20.8     7.5    12.1     40.      249.     53.      333.     19.     195.  **
** 1/24/79    1630   20.8     7.3    11.8     44.      249.     58.      328.     21.     192.  **
** 1/24/79    1645   20.8     7.6    11.5     42.      254.     57.      342.     20.     201.  **
** 1/24/79    1700   21.1     8.4    11.5     44.      252.     63.      361.     23.     212.  **
** 1/24/79    1715   21.1     7.5    11.3     42.      254.     56.      339.     20.     199.  **
** 1/24/79    1730   21.1     6.7    10.5     42.      256.     53.      323.     19.     189.  **
** 1/24/79    1745   21.1     6.8    11.3     42.      256.     53.      325.     19.     191.  **
** 1/24/79    1800   22.3     6.8    12.3     44.      260.     56.      330.     20.     194.  **
** 1/24/79    1815   22.3     6.8    12.3     50.      259.     63.      329.     23.     193.  **
** 1/24/79    1830   22.3     6.7    12.3     50.      259.     63.      326.     23.     192.  **
** 1/24/79    1845   22.3     6.3    12.1     50.      261.     61.      320.     22.     188.  **
** 1/24/79    1900   22.9     6.3    12.3     60.      262.     74.      321.     26.     189.  **
** 1/24/79    1915   22.9     6.2    12.3     65.      264.     79.      321.     28.     189.  **
** 1/24/79    1930   22.9     6.3    12.6     70.      263.     86.      322.     31.     189.  **
** 1/24/79    1945   22.9     7.0    12.6     70.      265.     90.      341.     32.     200.  **
** 1/24/79    2000   20.8     7.3    12.6     56.      255.     74.      336.     26.     197.  **
** 1/24/79    2015   20.8     7.5    11.5     60.      255.     80.      341.     29.     200.  **
** 1/24/79    2030   20.8     7.5    11.5     60.      255.     80.      341.     29.     200.  **
** 1/24/79    2045   20.8     7.1    11.5     60.      255.     78.      331.     28.     194.  **
** 1/24/79    2100   20.5     7.2    11.5     70.      250.     91.      327.     33.     192.  **
** 1/24/79    2115   20.5     7.2    11.8     60.      249.     78.      325.     28.     191.  **
** 1/24/79    2130   20.5     7.3    11.8     60.      243.     79.      320.     28.     188.  **
** 1/24/79    2145   20.5     7.5    11.8     49.      242.     65.      323.     23.     190.  **
** 1/24/79    2200   20.5     7.3    11.8     52.      240.     68.      316.     24.     185.  **
** 1/24/79    2215   20.5     7.6    11.3     48.      240.     65.      323.     23.     190.  **
** 1/24/79    2230   20.5     8.1    11.5     42.      240.     59.      336.     21.     197.  **
** 1/24/79    2245   20.5     8.1    11.5     42.      240.     59.      336.     21.     197.  **
** 1/24/79    2300   20.5     8.1    11.0     42.      234.     59.      327.     21.     192.  **
** 1/24/79    2315   20.5     8.1    11.0     42.      234.     59.      327.     21.     192.  **
** 1/24/79    2330   20.5     8.1    11.0     48.      234.     67.      327.     24.     192.  **
** 1/24/79    2345   20.5     8.1    11.0     48.      234.     67.      327.     24.     192.  **
** 1/24/79    2400   20.8     8.0    11.0     44.      234.     61.      325.     22.     191.  **
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15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
1/25/79	15	20.8	8.0	11.0	42.	232.	58.	322.	21.	189.
1/25/79	30	20.8	8.0	11.0	48.	229.	67.	318.	24.	187.
1/25/79	45	20.8	8.1	11.0	50.	224.	70.	313.	25.	184.
1/25/79	100	22.0	8.3	11.0	54.	231.	77.	328.	27.	193.
1/25/79	115	22.0	7.7	11.0	50.	238.	68.	323.	24.	189.
1/25/79	130	22.0	7.8	11.3	50.	239.	68.	327.	24.	192.
1/25/79	145	22.0	7.4	11.8	50.	240.	66.	318.	24.	187.
1/25/79	200	22.6	7.3	11.8	55.	240.	72.	316.	26.	185.
1/25/79	215	22.6	7.5	12.1	70.	240.	94.	321.	33.	188.
1/25/79	230	22.6	7.0	12.6	70.	230.	90.	296.	32.	174.
1/25/79	245	22.6	6.5	12.6	70.	230.	87.	286.	31.	168.
1/25/79	300	19.3	6.7	12.3	75.	230.	95.	290.	34.	170.
1/25/79	315	19.3	6.6	12.3	70.	230.	88.	288.	31.	169.
1/25/79	330	19.3	6.4	12.6	75.	230.	93.	284.	33.	167.
1/25/79	345	19.3	6.5	12.6	90.	230.	112.	286.	40.	168.
1/25/79	400	22.0	6.5	12.6	65.	228.	81.	283.	29.	166.
1/25/79	415	22.0	6.8	12.3	65.	219.	83.	278.	29.	163.
1/25/79	430	22.0	7.0	12.3	65.	218.	84.	281.	30.	165.
1/25/79	445	22.0	7.3	11.8	59.	210.	78.	276.	28.	162.
1/25/79	500	21.7	7.7	11.5	55.	212.	75.	287.	27.	169.
1/25/79	515	21.7	8.0	11.0	50.	209.	69.	290.	25.	170.
1/25/79	530	21.7	8.6	10.8	50.	205.	73.	298.	26.	175.
1/25/79	545	21.7	8.9	10.5	69.	205.	103.	306.	37.	180.
1/25/79	600	20.5	7.8	11.3	65.	204.	89.	279.	32.	164.
1/25/79	615	20.5	7.7	11.5	55.	204.	75.	277.	27.	162.
1/25/79	630	20.5	8.5	11.0	69.	210.	100.	303.	36.	178.
1/25/79	645	20.5	7.3	11.5	55.	222.	72.	292.	26.	172.
1/25/79	700	20.5	7.2	12.1	52.	222.	68.	290.	24.	170.
1/25/79	715	20.5	7.7	11.8	55.	218.	75.	296.	27.	174.
1/25/79	730	20.5	7.8	11.3	60.	220.	82.	301.	29.	176.
1/25/79	745	20.5	7.3	11.8	59.	230.	78.	303.	28.	178.
1/25/79	800	20.5	7.2	12.3	49.	239.	64.	312.	23.	183.
1/25/79	815	20.5	7.2	12.1	50.	240.	65.	314.	23.	184.
1/25/79	830	20.5	7.2	12.1	50.	240.	65.	314.	23.	184.
1/25/79	845	20.5	7.2	12.1	52.	240.	68.	314.	24.	184.
1/25/79	900	20.8	7.3	12.1	58.	248.	76.	326.	27.	192.
1/25/79	915	20.8	7.2	12.1	55.	249.	72.	325.	26.	191.
1/25/79	930	20.8	7.0	12.1	50.	256.	64.	330.	23.	194.
1/25/79	945	20.8	6.0	12.6	52.	259.	62.	311.	22.	183.
1/25/79	1000	22.0	7.1	12.1	50.	260.	65.	337.	23.	198.
1/25/79	1015	22.0	7.0	12.3	44.	259.	57.	334.	20.	196.
1/25/79	1030	22.0	7.3	12.1	42.	259.	55.	341.	20.	200.
1/25/79	1045	22.0	7.5	11.8	42.	259.	56.	346.	20.	203.
1/25/79	1100	20.5	7.5	11.8	42.	245.	56.	327.	20.	192.
1/25/79	1115	20.5	7.6	11.8	42.	245.	57.	330.	20.	194.
1/25/79	1130	20.5	7.9	11.3	44.	248.	61.	341.	22.	200.
1/25/79	1145	20.5	7.2	11.8	44.	244.	57.	319.	21.	187.
1/25/79	1200	20.5	7.1	12.1	45.	241.	58.	313.	21.	184.

15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
1/25/79	1215	20.5	7.1	12.3	50.	238.	65.	309.	23.	181.
1/25/79	1230	20.5	6.9	12.3	50.	240.	64.	307.	23.	180.
1/25/79	1245	20.5	7.2	12.3	48.	250.	63.	327.	22.	192.
1/25/79	1300	20.5	7.0	12.3	48.	252.	62.	325.	22.	191.
1/25/79	1315	20.5	6.9	12.3	59.	254.	75.	325.	27.	191.
1/25/79	1330	20.5	6.7	12.3	60.	259.	76.	326.	27.	192.
1/25/79	1345	20.5	6.8	12.6	45.	259.	57.	329.	20.	193.
1/25/79	1400	21.1	7.8	12.3	45.	255.	61.	348.	22.	205.
1/25/79	1415	21.1	8.0	11.3	35.	253.	49.	351.	17.	206.
1/25/79	1430	21.1	8.5	11.0	36.	255.	52.	368.	19.	216.
1/25/79	1445	21.1	8.5	10.8	40.	255.	58.	368.	21.	216.
1/25/79	1500	22.9	8.9	10.5	40.	250.	60.	373.	21.	219.
1/25/79	1515	22.9	7.5	11.3	40.	245.	53.	327.	19.	192.
1/25/79	1530	22.9	6.7	12.3	40.	249.	50.	314.	18.	184.
1/25/79	1545	22.9	7.0	12.3	40.	245.	52.	316.	18.	185.
1/25/79	1600	23.4	7.7	12.1	44.	240.	60.	325.	21.	191.
1/25/79	1615	23.4	7.2	11.8	50.	235.	65.	307.	23.	180.
1/25/79	1630	23.4	8.7	12.1	40.	232.	59.	340.	21.	200.
1/25/79	1645	23.4	7.6	10.8	35.	242.	47.	326.	17.	191.
1/25/79	1700	22.0	7.8	11.8	50.	235.	68.	321.	24.	189.
1/25/79	1715	22.0	7.7	11.5	45.	232.	61.	315.	22.	185.
1/25/79	1730	22.0	7.9	11.5	50.	232.	69.	319.	25.	188.
1/25/79	1745	22.0	8.1	11.3	45.	225.	63.	315.	22.	185.
1/25/79	1800	19.9	7.4	11.3	49.	239.	65.	317.	23.	186.
1/25/79	1815	19.9	7.3	11.8	42.	239.	55.	315.	20.	185.
1/25/79	1830	19.9	7.7	11.5	44.	239.	60.	324.	21.	190.
1/25/79	1845	19.9	7.8	11.5	42.	232.	57.	317.	21.	186.
1/25/79	1900	20.5	7.8	11.5	41.	231.	56.	316.	20.	185.
1/25/79	1915	20.5	8.0	11.5	44.	232.	61.	322.	22.	189.
1/25/79	1930	20.5	7.7	11.5	49.	220.	66.	298.	24.	175.
1/25/79	1945	20.5	7.5	11.8	50.	210.	67.	281.	24.	165.
1/25/79	2000	20.8	8.0	11.8	42.	218.	58.	302.	21.	178.
1/25/79	2015	20.8	8.4	11.3	48.	215.	69.	308.	25.	181.
1/25/79	2030	20.8	6.8	10.8	50.	218.	63.	277.	23.	162.
1/25/79	2045	20.8	7.0	12.6	50.	218.	64.	281.	23.	165.
1/25/79	2100	21.7	6.8	12.6	50.	218.	63.	277.	23.	162.
1/25/79	2115	21.7	6.7	12.6	55.	215.	69.	271.	25.	159.
1/25/79	2130	21.7	6.6	12.6	60.	218.	75.	273.	27.	160.
1/25/79	2145	21.7	6.5	12.9	50.	219.	62.	272.	22.	160.
1/25/79	2200	22.3	7.0	12.6	50.	222.	64.	286.	23.	168.
1/25/79	2215	22.3	7.2	12.3	48.	221.	63.	289.	22.	170.
1/25/79	2230	22.3	7.3	12.1	42.	221.	55.	291.	20.	171.
1/25/79	2245	22.3	7.5	12.1	42.	221.	56.	295.	20.	173.
1/25/79	2300	21.4	7.6	11.8	44.	221.	59.	297.	21.	175.
1/25/79	2315	21.4	7.7	11.8	50.	222.	68.	301.	24.	177.
1/25/79	2330	21.4	7.8	11.8	50.	223.	68.	305.	24.	179.
1/25/79	2345	21.4	7.5	11.8	47.	224.	63.	299.	22.	176.
1/25/79	2400	22.9	7.9	11.8	50.	229.	69.	315.	25.	185.

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**                                                                                            **
**                                      15 MIN. DATA                                          **
**                              DRY STACK GAS CONCENTRATION                                   **
**                                                                                            **
**                            O2      CO2      CO       NO       CO       NO       CO      NO **
**                    LOAD    VOL%    VOL%     PPMV     PPMV     PPMV     PPMV     NG/J    NG/J **
**   DATE     TIME    MWTH    MEAS    MEAS     MEAS     MEAS     3%O2     3%O2                 **
************************************************************************************************
** 1/26/79      15    22.9    8.0     11.5     50.      227.     69.      315.     25.     185. **
** 1/26/79      30    22.9    7.8     11.5     44.      229.     60.      313.     21.     184. **
** 1/26/79      45    22.9    8.0     11.5     42.      229.     58.      318.     21.     187. **
** 1/26/79     100    22.9    8.0     11.5     40.      230.     56.      319.     20.     187. **
** 1/26/79     115    22.9    8.0     11.8     42.      220.     58.      305.     21.     179. **
** 1/26/79     130    22.9    7.9     11.8     44.      220.     61.      303.     22.     178. **
** 1/26/79     145    22.9    7.9     11.5     48.      220.     66.      303.     24.     178. **
** 1/26/79     200    22.0    7.8     12.1     48.      218.     66.      298.     23.     175. **
** 1/26/79     215    22.0    7.5     11.8     44.      216.     59.      289.     21.     169. **
** 1/26/79     230    22.0    7.8     12.1     50.      214.     68.      292.     24.     172. **
** 1/26/79     245    22.0    7.6     12.3     54.      212.     73.      285.     26.     168. **
** 1/26/79     300    20.5    7.5     12.3     70.      212.     94.      283.     33.     166. **
** 1/26/79     315    20.5    7.3     12.3     42.      212.     55.      279.     20.     164. **
** 1/26/79     330    20.5    7.1     12.3     40.      212.     52.      275.     19.     161. **
** 1/26/79     345    20.5    7.3     12.1     40.      214.     53.      282.     19.     165. **
** 1/26/79     400    20.2    7.5     11.5     44.      213.     59.      285.     21.     167. **
** 1/26/79     415    20.2    8.0     11.5     42.      218.     58.      302.     21.     178. **
** 1/26/79     430    20.2    8.2     11.8     46.      220.     65.      310.     23.     182. **
** 1/26/79     445    20.2    7.8     11.8     45.      221.     61.      302.     22.     177. **
** 1/26/79     500    20.5    7.8     11.5     45.      215.     61.      294.     22.     172. **
** 1/26/79     515    20.5    8.2     12.1     48.      224.     68.      316.     24.     185. **
** 1/26/79     530    20.5    7.8     11.8     43.      228.     59.      312.     21.     183. **
** 1/26/79     545    20.5    7.8     11.8     45.      225.     61.      307.     22.     181. **
** 1/26/79     600    20.5    8.0     11.5     50.      224.     69.      311.     25.     182. **
** 1/26/79     615    20.5    8.1     12.1     52.      228.     73.      319.     26.     187. **
** 1/26/79     630    20.5    8.0     12.3     50.      229.     69.      318.     25.     187. **
** 1/26/79     645    20.5    7.0     12.6     62.      230.     80.      296.     29.     178. **
** 1/26/79     700    20.8    7.0     12.6     54.      229.     70.      295.     25.     173. **
** 1/26/79     715    20.8    7.0      6.9     54.      224.     70.      288.     25.     169. **
** 1/26/79     730    20.8    6.8     12.6     80.      231.    102.      293.     36.     172. **
** 1/26/79     745    20.8    6.7     12.9     56.      223.     71.      281.     25.     165. **
** 1/26/79     800    20.8    6.5     12.3     65.      223.     81.      277.     29.     163. **
** 1/26/79     815    20.8    7.3     12.1     74.      222.     97.      292.     35.     172. **
** 1/26/79     830    20.8    7.4     12.3     60.      218.     80.      289.     28.     170. **
** 1/26/79     845    20.8    7.2     12.3     50.      220.     65.      287.     23.     169. **
** 1/26/79     900    20.5    7.5     12.1     55.      218.     73.      291.     26.     171. **
** 1/26/79     915    20.5    7.5     12.3     60.      215.     80.      287.     29.     169. **
** 1/26/79     930    20.5    7.4     12.3     80.      213.    106.      282.     38.     166. **
** 1/26/79     945    20.5    7.3     12.3     60.      213.     79.      280.     28.     165. **
** 1/26/79    1000    20.8    7.3     11.8     65.      215.     86.      283.     31.     166. **
** 1/26/79    1015    20.8    7.4     12.1    100.      213.    133.      282.     47.     166. **
** 1/26/79    1030    20.8    7.0     12.3     80.      205.    103.      264.     37.     155. **
** 1/26/79    1045    20.8    7.0     12.6     80.      210.    103.      270.     37.     159. **
** 1/26/79    1100    21.1    6.8     12.6     70.      210.     89.      267.     32.     157. **
** 1/26/79    1115    21.1    6.6     12.6     60.      205.     75.      257.     27.     151. **
** 1/26/79    1130    21.1    7.1     12.1     60.      210.     78.      272.     28.     160. **
** 1/26/79    1145    21.1    7.2     12.1     60.      212.     78.      277.     28.     163. **
** 1/26/79    1200    20.8    6.7     12.6     62.      213.     78.      268.     28.     158. **
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15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
1/26/79	1215	20.8	6.8	12.3	70.	214.	89.	272.	32.	160.
1/26/79	1230	20.8	6.7	12.6	75.	216.	95.	272.	34.	160.
1/26/79	1245	20.8	6.7	12.3	75.	214.	95.	270.	34.	158.
1/26/79	1300	20.5	7.1	12.1	80.	214.	104.	278.	37.	163.
1/26/79	1315	20.5	6.7	12.3	58.	212.	73.	267.	26.	157.
1/26/79	1330	20.5	7.4	12.1	55.	216.	73.	286.	26.	168.
1/26/79	1345	20.5	7.3	12.1	55.	217.	72.	286.	26.	168.
1/26/79	1400	20.5	7.4	12.1	69.	218.	91.	289.	33.	170.
1/26/79	1415	20.5	7.1	12.1	62.	215.	80.	279.	29.	164.
1/26/79	1430	20.5	7.5	11.8	65.	218.	87.	291.	31.	171.
1/26/79	1445	20.5	7.9	11.3	65.	215.	89.	296.	32.	174.
1/26/79	1500	20.5	8.1	11.0	60.	205.	84.	287.	30.	168.
1/26/79	1515	20.5	8.5	10.8	55.	208.	79.	300.	28.	176.
1/26/79	1530	20.5	8.9	10.5	54.	202.	81.	301.	29.	177.
1/26/79	1545	20.5	8.8	10.5	54.	202.	80.	299.	29.	175.
1/26/79	1600	21.7	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
1/26/79	1615	21.7	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
1/26/79	1630	21.7	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
1/26/79	1645	21.7	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
1/26/79	1700	20.5	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
1/26/79	1715	20.5	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
1/26/79	1730	20.5	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
1/26/79	1745	20.5	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
1/26/79	1800	20.5	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
1/26/79	1815	20.5	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
1/26/79	1830	20.5	7.0	12.1	55.	212.	71.	273.	25.	160.
1/26/79	1845	20.5	7.0	12.1	54.	212.	70.	273.	25.	160.
1/26/79	1900	21.7	7.3	12.1	55.	211.	72.	278.	26.	163.
1/26/79	1915	21.7	7.5	12.1	55.	210.	73.	281.	26.	165.
1/26/79	1930	21.7	7.4	11.8	60.	210.	80.	278.	28.	163.
1/26/79	1945	21.7	7.5	12.1	55.	210.	73.	281.	26.	165.
1/26/79	2000	22.0	7.5	11.8	56.	213.	75.	285.	27.	167.
1/26/79	2015	22.0	7.4	11.8	59.	208.	78.	276.	28.	162.
1/26/79	2030	22.0	7.5	11.8	60.	213.	80.	285.	29.	167.
1/26/79	2045	22.0	7.1	12.1	55.	217.	71.	281.	25.	165.
1/26/79	2100	22.6	7.3	12.1	58.	218.	76.	287.	27.	168.
1/26/79	2115	22.6	7.4	12.1	59.	219.	78.	290.	28.	170.
1/26/79	2130	22.6	7.3	11.8	50.	219.	66.	288.	24.	169.
1/26/79	2145	22.6	7.3	11.8	55.	218.	72.	287.	26.	168.
1/26/79	2200	22.6	7.3	12.1	55.	218.	72.	287.	26.	168.
1/26/79	2215	22.6	7.2	12.1	58.	218.	76.	285.	27.	167.
1/26/79	2230	22.6	7.3	12.1	50.	219.	66.	288.	24.	169.
1/26/79	2245	22.6	7.3	12.1	45.	218.	59.	287.	21.	168.
1/26/79	2300	22.6	7.3	12.1	44.	221.	58.	291.	21.	171.
1/26/79	2315	22.6	7.1	12.1	46.	218.	60.	283.	21.	166.
1/26/79	2330	22.6	7.0	12.1	52.	206.	67.	265.	24.	156.
1/26/79	2345	22.6	7.2	12.1	70.	208.	91.	272.	33.	160.
1/26/79	2400	20.5	7.1	12.1	65.	208.	84.	270.	30.	158.

15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
1/27/79	15	20.5	7.2	12.1	60.	208.	78.	272.	28.	160.
1/27/79	30	20.5	7.5	11.8	50.	208.	67.	278.	24.	163.
1/27/79	45	20.5	7.5	11.8	48.	208.	64.	278.	23.	163.
1/27/79	100	20.5	7.6	11.5	49.	206.	66.	277.	24.	163.
1/27/79	115	20.5	7.7	11.5	50.	200.	68.	271.	24.	159.
1/27/79	130	20.5	8.0	11.5	50.	200.	69.	278.	25.	163.
1/27/79	145	20.5	7.8	11.3	45.	202.	61.	276.	22.	162.
1/27/79	200	20.5	7.8	11.5	43.	204.	59.	279.	21.	164.
1/27/79	215	20.5	7.9	11.5	45.	208.	62.	286.	22.	168.
1/27/79	230	20.5	7.7	11.5	49.	208.	66.	282.	24.	166.
1/27/79	245	20.5	7.9	11.5	48.	208.	66.	286.	24.	168.
1/27/79	300	20.5	7.7	11.5	45.	208.	61.	282.	22.	166.
1/27/79	315	20.5	7.9	11.5	49.	208.	67.	286.	24.	168.
1/27/79	330	20.5	7.8	11.5	47.	208.	64.	284.	23.	167.
1/27/79	345	20.5	7.7	11.5	45.	209.	61.	283.	22.	166.
1/27/79	400	20.5	7.7	11.5	45.	209.	61.	283.	22.	166.
1/27/79	415	20.5	7.7	11.5	43.	210.	58.	285.	21.	167.
1/27/79	430	20.5	7.5	11.5	43.	208.	57.	278.	21.	163.
1/27/79	445	20.5	7.5	11.8	43.	208.	57.	278.	21.	163.
1/27/79	500	20.5	7.4	11.8	44.	208.	58.	276.	21.	162.
1/27/79	515	20.5	7.4	11.8	48.	200.	64.	265.	23.	156.
1/27/79	530	20.5	7.5	11.8	50.	208.	67.	278.	24.	163.
1/27/79	545	20.5	7.3	11.8	48.	208.	63.	274.	23.	161.
1/27/79	600	20.5	7.4	11.8	48.	205.	64.	272.	23.	160.
1/27/79	615	20.5	7.6	11.8	50.	205.	67.	276.	24.	162.
1/27/79	630	20.5	7.7	11.5	50.	210.	68.	285.	24.	167.
1/27/79	645	20.5	7.5	11.5	60.	210.	80.	281.	29.	165.
1/27/79	700	20.5	7.5	11.8	60.	220.	80.	294.	29.	173.
1/27/79	715	20.5	7.0	11.8	50.	221.	64.	285.	23.	167.
1/27/79	730	20.5	7.1	12.1	42.	224.	54.	291.	19.	171.
1/27/79	745	20.5	7.3	11.8	40.	225.	53.	296.	19.	174.
1/27/79	800	20.5	7.6	11.8	40.	226.	54.	304.	19.	179.
1/27/79	815	20.5	7.6	11.5	44.	228.	59.	307.	21.	180.
1/27/79	830	20.5	7.2	11.8	45.	220.	59.	287.	21.	169.
1/27/79	845	20.5	8.1	11.8	43.	228.	60.	319.	21.	187.
1/27/79	900	20.5	7.6	11.0	50.	232.	67.	312.	24.	183.
1/27/79	915	20.5	7.4	11.3	60.	232.	80.	308.	28.	181.
1/27/79	930	20.5	7.0	12.1	55.	234.	71.	301.	25.	177.
1/27/79	945	20.5	7.6	12.1	45.	225.	61.	303.	22.	178.
1/27/79	1000	19.3	8.0	11.8	45.	232.	62.	322.	22.	189.
1/27/79	1015	19.3	8.4	11.0	43.	242.	62.	347.	22.	203.
1/27/79	1030	19.3	8.0	10.8	45.	238.	62.	330.	22.	194.
1/27/79	1045	19.3	7.6	11.3	42.	230.	57.	310.	20.	182.
1/27/79	1100	19.3	8.0	11.3	42.	230.	58.	319.	21.	187.
1/27/79	1115	19.3	8.5	11.3	42.	225.	61.	325.	22.	191.
1/27/79	1130	19.3	7.6	10.5	42.	222.	57.	299.	20.	175.
1/27/79	1145	19.3	7.3	12.1	42.	218.	55.	287.	20.	168.
1/27/79	1200	20.5	7.6	11.8	50.	224.	67.	301.	24.	177.

15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
1/27/79	1215	20.5	7.2	12.1	48.	220.	63.	287.	22.	169.
1/27/79	1230	20.5	7.3	11.8	50.	210.	66.	276.	24.	162.
1/27/79	1245	20.5	7.6	11.8	50.	224.	67.	301.	24.	177.
1/27/79	1300	20.5	7.2	11.5	50.	230.	65.	301.	23.	176.
1/27/79	1315	20.5	7.0	12.1	55.	240.	71.	309.	25.	181.
1/27/79	1330	20.5	7.0	12.1	55.	240.	71.	309.	25.	181.
1/27/79	1345	20.5	6.9	12.1	80.	243.	102.	311.	37.	182.
1/27/79	1400	20.8	6.8	12.3	70.	245.	89.	311.	32.	183.
1/27/79	1415	20.8	7.0	12.3	75.	250.	97.	322.	35.	189.
1/27/79	1430	20.8	6.9	12.3	95.	250.	121.	320.	43.	188.
1/27/79	1445	20.8	7.1	12.1	95.	250.	123.	324.	44.	190.
1/27/79	1500	20.8	7.0	12.3	58.	248.	75.	319.	27.	188.
1/27/79	1515	20.8	7.1	12.3	62.	244.	80.	316.	29.	186.
1/27/79	1530	20.8	7.1	12.1	58.	243.	75.	315.	27.	185.
1/27/79	1545	20.8	7.3	12.3	60.	240.	79.	316.	28.	185.
1/27/79	1600	22.0	7.2	12.1	60.	225.	78.	294.	28.	173.
1/27/79	1615	22.0	6.2	12.1	125.	225.	152.	274.	54.	161.
1/27/79	1630	22.0	6.6	12.6	100.	232.	125.	290.	45.	171.
1/27/79	1645	22.0	7.0	12.6	95.	232.	122.	299.	44.	175.
1/27/79	1700	19.0	7.4	12.3	59.	224.	78.	297.	28.	174.
1/27/79	1715	19.0	8.0	12.1	50.	222.	69.	308.	25.	181.
1/27/79	1730	19.0	8.5	11.3	58.	220.	84.	318.	30.	186.
1/27/79	1745	19.0	8.5	11.0	54.	220.	78.	318.	28.	186.
1/27/79	1800	19.3	8.3	11.0	54.	216.	77.	307.	27.	180.
1/27/79	1815	19.3	8.9	11.0	54.	222.	81.	331.	29.	194.
1/27/79	1830	19.3	7.5	11.0	70.	222.	94.	297.	33.	174.
1/27/79	1845	19.3	6.2	10.8	150.	222.	183.	270.	65.	159.
1/27/79	1900	20.5	7.0	12.6	42.	220.	54.	283.	19.	166.
1/27/79	1915	20.5	8.0	12.6	43.	220.	60.	305.	21.	179.
1/27/79	1930	20.5	8.4	11.3	42.	225.	60.	322.	21.	189.
1/27/79	1945	20.5	8.9	11.0	65.	224.	97.	334.	35.	196.
1/27/79	2000	20.5	6.5	10.3	100.	228.	124.	283.	44.	166.
1/27/79	2015	20.5	7.2	12.6	42.	220.	55.	287.	20.	169.
1/27/79	2030	20.5	8.5	12.6	44.	212.	64.	306.	23.	180.
1/27/79	2045	20.5	8.0	11.3	44.	234.	61.	325.	22.	191.
1/27/79	2100	20.5	6.5	10.8	75.	234.	93.	291.	33.	171.
1/27/79	2115	20.5	6.6	12.1	68.	240.	85.	300.	30.	176.
1/27/79	2130	20.5	6.6	12.6	70.	242.	88.	303.	31.	178.
1/27/79	2145	20.5	7.0	12.6	52.	240.	67.	309.	24.	181.
1/27/79	2200	16.1	8.0	12.3	45.	272.	62.	377.	22.	222.
1/27/79	2215	16.1	9.9	12.1	45.	230.	73.	374.	26.	220.
1/27/79	2230	16.1	9.5	9.3	59.	248.	93.	389.	33.	229.
1/27/79	2245	16.1	8.9	9.6	45.	245.	67.	365.	24.	215.
1/27/79	2300	19.0	8.2	10.5	45.	242.	63.	341.	23.	200.
1/27/79	2315	19.0	8.3	10.8	45.	239.	64.	340.	23.	199.
1/27/79	2330	19.0	8.0	11.3	44.	234.	61.	325.	22.	191.
1/27/79	2345	19.0	7.8	11.0	50.	232.	68.	317.	24.	186.
1/27/79	2400	20.5	7.7	11.3	55.	230.	75.	312.	27.	183.

15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
1/28/79	15	20.5	7.6	11.8	55.	230.	74.	310.	26.	182.
1/28/79	30	20.5	7.5	11.8	55.	230.	73.	307.	26.	180.
1/28/79	45	20.5	7.4	11.8	55.	234.	73.	310.	26.	182.
1/28/79	100	20.5	7.3	11.5	60.	234.	79.	308.	28.	181.
1/28/79	115	20.5	7.4	12.1	50.	232.	66.	308.	24.	181.
1/28/79	130	20.5	7.5	12.1	48.	230.	64.	307.	23.	180.
1/28/79	145	20.5	8.0	11.8	53.	228.	74.	316.	26.	186.
1/28/79	200	20.5	8.0	11.8	53.	230.	74.	319.	26.	187.
1/28/79	215	20.5	7.5	11.5	60.	230.	80.	307.	29.	180.
1/28/79	230	20.5	8.1	11.3	59.	230.	83.	322.	29.	189.
1/28/79	245	20.5	8.3	11.8	69.	242.	98.	344.	35.	202.
1/28/79	300	20.5	7.5	11.3	66.	232.	88.	310.	32.	182.
1/28/79	315	20.5	7.3	11.3	65.	242.	86.	319.	31.	187.
1/28/79	330	20.5	7.6	11.8	56.	242.	75.	326.	27.	191.
1/28/79	345	20.5	7.4	11.8	58.	242.	77.	321.	27.	188.
1/28/79	400	20.5	7.6	12.1	53.	239.	71.	322.	25.	189.
1/28/79	415	20.5	7.7	12.1	60.	242.	81.	328.	29.	193.
1/28/79	430	20.5	7.5	11.8	61.	238.	81.	318.	29.	187.
1/28/79	445	20.5	7.3	11.8	58.	237.	76.	312.	27.	183.
1/28/79	500	20.5	7.2	12.1	59.	236.	77.	308.	28.	181.
1/28/79	515	20.5	7.3	12.1	60.	234.	79.	308.	28.	181.
1/28/79	530	20.5	7.5	12.3	65.	220.	87.	294.	31.	173.
1/28/79	545	20.5	7.5	12.1	65.	220.	87.	294.	31.	173.
1/28/79	600	20.5	7.0	12.1	90.	222.	116.	286.	41.	168.
1/28/79	615	20.5	7.3	11.8	70.	226.	92.	297.	33.	175.
1/28/79	630	20.5	7.2	12.3	64.	224.	84.	293.	30.	172.
1/28/79	645	20.5	7.9	12.1	57.	228.	78.	314.	28.	184.
1/28/79	700	20.8	7.7	12.1	53.	228.	72.	309.	26.	182.
1/28/79	715	20.8	7.5	11.5	53.	230.	71.	307.	25.	180.
1/28/79	730	20.8	7.4	11.8	55.	224.	73.	297.	26.	174.
1/28/79	745	20.8	7.3	12.1	70.	228.	92.	300.	33.	176.
1/28/79	800	20.5	7.6	12.1	50.	232.	67.	312.	24.	183.
1/28/79	815	20.5	7.9	12.1	53.	232.	73.	319.	26.	188.
1/28/79	830	20.5	7.6	11.8	53.	234.	71.	315.	25.	185.
1/28/79	845	20.5	7.7	11.8	54.	230.	73.	312.	26.	183.
1/28/79	900	20.5	7.9	12.1	53.	239.	73.	329.	26.	193.
1/28/79	915	20.5	7.6	11.5	57.	236.	77.	318.	27.	186.
1/28/79	930	20.5	7.5	11.5	58.	235.	77.	314.	28.	184.
1/28/79	945	20.5	7.5	11.8	55.	246.	73.	329.	26.	193.
1/28/79	1000	20.5	7.5	12.1	60.	243.	80.	325.	29.	191.
1/28/79	1015	20.5	7.5	11.8	59.	243.	79.	325.	28.	191.
1/28/79	1030	20.5	7.3	12.1	62.	240.	82.	316.	29.	185.
1/28/79	1045	20.5	7.5	12.1	65.	240.	87.	321.	31.	188.
1/28/79	1100	20.8	8.4	12.1	54.	230.	77.	329.	28.	193.
1/28/79	1115	20.8	8.0	11.3	53.	230.	74.	319.	26.	187.
1/28/79	1130	20.8	7.8	11.0	61.	230.	83.	314.	30.	185.
1/28/79	1145	20.8	7.6	11.5	70.	226.	94.	304.	34.	179.
1/28/79	1200	20.5	7.4	11.8	125.	212.	166.	281.	59.	165.

15 MIN. DATA

DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
1/28/79	1215	20.5	8.2	11.8	200.	215.	282.	303.	101.	178.
1/28/79	1230	20.5	8.0	12.3	110.	218.	153.	302.	55.	178.
1/28/79	1245	20.5	8.1	11.0	70.	215.	98.	301.	35.	177.
1/28/79	1300	20.5	8.2	11.5	70.	221.	99.	311.	35.	183.
1/28/79	1315	20.5	8.2	11.5	65.	222.	92.	313.	33.	184.
1/28/79	1330	20.5	8.1	11.3	65.	216.	91.	302.	32.	177.
1/28/79	1345	20.5	8.2	11.5	65.	222.	92.	313.	33.	184.
1/28/79	1400	20.5	8.1	11.5	62.	225.	87.	315.	31.	185.
1/28/79	1415	20.5	8.1	11.3	58.	228.	81.	319.	29.	187.
1/28/79	1430	20.5	8.1	11.5	60.	231.	84.	323.	30.	190.
1/28/79	1445	20.5	7.9	11.3	58.	231.	80.	318.	29.	187.
1/28/79	1500	20.5	8.0	11.5	70.	226.	97.	314.	35.	184.
1/28/79	1515	20.5	8.6	11.5	58.	224.	84.	326.	30.	191.
1/28/79	1530	20.5	9.3	11.5	55.	231.	85.	356.	30.	209.
1/28/79	1545	20.5	9.0	11.0	60.	230.	90.	346.	32.	203.
1/28/79	1600	20.5	8.7	10.3	60.	230.	88.	337.	31.	198.
1/28/79	1615	20.5	8.0	10.8	70.	232.	97.	322.	35.	189.
1/28/79	1630	20.5	7.3	10.8	100.	230.	132.	303.	47.	178.
1/28/79	1645	20.5	7.2	11.8	130.	230.	170.	301.	61.	176.
1/28/79	1700	20.5	7.5	12.3	95.	234.	127.	313.	45.	184.
1/28/79	1715	20.5	7.9	12.6	75.	228.	103.	314.	37.	184.
1/28/79	1730	20.5	8.4	12.3	54.	230.	77.	329.	28.	193.
1/28/79	1745	20.5	8.4	11.8	58.	225.	83.	322.	30.	189.
1/28/79	1800	20.5	8.4	11.3	54.	230.	77.	329.	28.	193.
1/28/79	1815	20.5	8.4	11.5	59.	230.	84.	329.	30.	193.
1/28/79	1830	20.5	8.3	11.3	59.	225.	84.	320.	30.	188.
1/28/79	1845	20.5	8.3	11.5	58.	223.	82.	317.	29.	186.
1/28/79	1900	20.5	8.3	11.5	58.	220.	82.	313.	29.	184.
1/28/79	1915	20.5	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
1/28/79	1930	20.5	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
1/28/79	1945	20.5	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
1/28/79	2000	19.0	7.5	11.5	58.	218.	77.	291.	28.	171.
1/28/79	2015	19.0	7.7	11.5	57.	212.	77.	287.	28.	169.
1/28/79	2030	19.0	8.5	11.3	56.	215.	81.	310.	29.	182.
1/28/79	2045	19.0	8.6	11.5	59.	213.	86.	310.	31.	182.
1/28/79	2100	19.3	8.7	11.3	42.	214.	62.	314.	22.	184.
1/28/79	2115	19.3	8.8	11.0	42.	215.	62.	318.	22.	187.
1/28/79	2130	19.3	8.7	11.3	43.	215.	63.	315.	23.	185.
1/28/79	2145	19.3	8.5	11.0	42.	218.	61.	315.	22.	185.
1/28/79	2200	20.5	8.7	11.3	42.	214.	62.	314.	22.	184.
1/28/79	2215	20.5	8.8	11.0	42.	217.	62.	321.	22.	188.
1/28/79	2230	20.5	8.0	11.3	44.	216.	61.	300.	22.	176.
1/28/79	2245	20.5	7.8	10.8	46.	220.	63.	301.	22.	176.
1/28/79	2300	20.5	7.8	11.5	45.	220.	61.	301.	22.	176.
1/28/79	2315	20.5	7.6	11.8	43.	220.	58.	296.	21.	174.
1/28/79	2330	20.5	7.6	11.8	44.	219.	59.	295.	21.	173.
1/28/79	2345	20.5	7.5	12.1	42.	229.	56.	306.	20.	180.
1/28/79	2400	20.5	6.9	12.3	42.	232.	54.	297.	19.	174.

15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
1/29/79	15	20.5	6.5	12.1	56.	230.	70.	286.	25.	168.
1/29/79	30	20.5	6.5	12.1	70.	228.	87.	283.	31.	166.
1/29/79	45	20.5	7.8	12.6	120.	225.	164.	307.	59.	181.
1/29/79	100	19.9	7.7	13.2	80.	220.	108.	298.	39.	175.
1/29/79	115	19.9	8.5	13.2	68.	224.	98.	323.	35.	190.
1/29/79	130	19.9	7.7	11.8	70.	222.	95.	301.	34.	177.
1/29/79	145	19.9	7.2	10.5	65.	216.	85.	282.	30.	166.
1/29/79	200	20.8	7.0	12.6	100.	212.	129.	273.	46.	160.
1/29/79	215	20.8	6.7	12.6	75.	210.	95.	265.	34.	155.
1/29/79	230	20.8	7.2	12.3	75.	210.	98.	274.	35.	161.
1/29/79	245	20.8	7.5	12.3	72.	208.	96.	278.	34.	163.
1/29/79	300	20.5	7.6	12.1	70.	210.	94.	283.	34.	166.
1/29/79	315	20.5	7.8	12.1	70.	213.	96.	291.	34.	171.
1/29/79	330	20.5	7.8	11.8	70.	214.	96.	292.	34.	172.
1/29/79	345	20.5	7.8	11.8	75.	214.	102.	292.	37.	172.
1/29/79	400	20.5	7.9	12.1	68.	210.	94.	289.	33.	170.
1/29/79	415	20.5	8.5	11.8	65.	215.	94.	310.	34.	182.
1/29/79	430	20.5	8.3	11.3	65.	218.	92.	310.	33.	182.
1/29/79	445	20.5	8.2	11.5	68.	215.	96.	303.	34.	178.
1/29/79	500	20.5	8.2	11.5	75.	205.	106.	289.	38.	170.
1/29/79	515	20.5	8.5	11.5	74.	224.	107.	323.	38.	190.
1/29/79	530	20.5	8.1	11.5	74.	222.	103.	310.	37.	182.
1/29/79	545	20.5	7.8	11.5	80.	220.	109.	301.	39.	176.
1/29/79	600	20.5	8.1	12.1	70.	220.	98.	308.	35.	181.
1/29/79	615	20.5	8.2	11.5	70.	222.	99.	313.	35.	184.
1/29/79	630	20.5	8.1	11.8	70.	225.	98.	315.	35.	185.
1/29/79	645	20.5	8.0	11.5	62.	232.	86.	322.	31.	189.
1/29/79	700	21.1	7.2	11.8	55.	230.	72.	301.	26.	176.
1/29/79	715	21.1	8.1	12.6	65.	225.	91.	315.	32.	185.
1/29/79	730	21.1	8.2	11.8	60.	228.	85.	321.	30.	189.
1/29/79	745	21.1	8.1	11.8	59.	223.	83.	312.	29.	183.
1/29/79	800	20.5	8.3	11.8	59.	223.	84.	317.	30.	186.
1/29/79	815	20.5	8.3	11.5	59.	210.	84.	298.	30.	175.
1/29/79	830	20.5	8.5	11.5	69.	218.	100.	315.	36.	185.
1/29/79	845	20.5	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
1/29/79	900	20.5	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
1/29/79	915	20.5	7.3	11.3	90.	220.	118.	290.	42.	170.
1/29/79	930	20.5	7.4	.0	-1.	225.	-1.	298.	-1.	175.
1/29/79	945	20.5	7.8	11.3	55.	228.	75.	312.	27.	183.
1/29/79	1000	20.5	7.5	11.3	53.	230.	71.	307.	25.	180.
1/29/79	1015	20.5	7.5	11.3	49.	230.	65.	307.	23.	180.
1/29/79	1030	20.5	7.6	11.5	52.	278.	70.	374.	25.	220.
1/29/79	1045	20.5	7.7	11.5	60.	228.	81.	309.	29.	182.
1/29/79	1100	20.5	7.6	11.3	44.	230.	59.	310.	21.	182.
1/29/79	1115	20.5	7.9	11.3	40.	228.	55.	314.	20.	184.
1/29/79	1130	20.5	7.4	11.0	50.	230.	66.	305.	24.	179.
1/29/79	1145	20.5	7.4	11.5	60.	230.	80.	305.	28.	179.
1/29/79	1200	20.5	7.5	11.5	50.	235.	67.	314.	24.	184.

15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
1/29/79	1215	20.5	7.8	11.3	39.	230.	53.	314.	19.	185.
1/29/79	1230	20.5	7.9	11.0	44.	240.	61.	330.	22.	194.
1/29/79	1245	20.5	7.3	10.8	45.	240.	59.	316.	21.	185.
1/29/79	1300	20.8	6.9	11.8	45.	235.	58.	300.	21.	176.
1/29/79	1315	20.8	7.9	11.3	50.	233.	69.	321.	25.	188.
1/29/79	1330	20.8	7.5	11.3	36.	233.	48.	311.	17.	183.
1/29/79	1345	20.8	7.6	11.5	50.	236.	67.	318.	24.	186.
1/29/79	1400	20.5	8.0	11.5	34.	238.	47.	330.	17.	194.
1/29/79	1415	20.5	7.7	11.5	34.	239.	46.	324.	16.	190.
1/29/79	1430	20.5	7.7	11.3	34.	239.	46.	324.	16.	190.
1/29/79	1445	20.5	7.6	11.0	40.	240.	54.	323.	19.	190.
1/29/79	1500	20.5	7.5	11.3	33.	240.	44.	321.	16.	188.
1/29/79	1515	20.5	7.3	11.3	39.	243.	51.	320.	18.	188.
1/29/79	1530	20.5	7.2	11.5	35.	243.	46.	317.	16.	186.
1/29/79	1545	20.5	7.8	11.3	38.	245.	52.	335.	19.	197.
1/29/79	1600	20.5	7.7	11.3	35.	235.	47.	319.	17.	187.
1/29/79	1615	20.5	7.3	11.5	33.	249.	43.	328.	16.	192.
1/29/79	1630	20.5	7.0	11.5	31.	248.	40.	319.	14.	188.
1/29/79	1645	20.5	7.0	11.5	34.	245.	44.	316.	16.	185.
1/29/79	1700	20.5	7.0	11.8	38.	240.	49.	309.	17.	181.
1/29/79	1715	20.5	7.5	11.5	32.	242.	43.	323.	15.	190.
1/29/79	1730	20.5	7.5	11.5	32.	240.	43.	321.	15.	188.
1/29/79	1745	20.5	7.4	11.3	32.	235.	42.	312.	15.	183.
1/29/79	1800	20.5	7.0	11.3	40.	229.	52.	295.	18.	173.
1/29/79	1815	20.5	7.3	11.3	95.	228.	125.	300.	45.	176.
1/29/79	1830	20.5	7.0	11.8	95.	220.	122.	283.	44.	166.
1/29/79	1845	20.5	7.0	11.8	95.	221.	122.	285.	44.	167.
1/29/79	1900	20.8	7.1	11.8	95.	223.	123.	289.	44.	170.
1/29/79	1915	20.8	7.0	11.8	85.	222.	109.	286.	39.	168.
1/29/79	1930	20.8	7.3	11.8	75.	226.	99.	297.	35.	175.
1/29/79	1945	20.8	7.5	11.5	63.	228.	84.	305.	30.	179.
1/29/79	2000	20.5	7.6	11.5	60.	215.	81.	289.	29.	170.
1/29/79	2015	20.5	7.8	11.3	42.	228.	57.	312.	21.	183.
1/29/79	2030	20.5	7.7	11.0	68.	229.	92.	311.	33.	182.
1/29/79	2045	20.5	8.1	11.0	45.	232.	63.	324.	22.	190.
1/29/79	2100	20.2	7.5	11.3	35.	233.	47.	311.	17.	183.
1/29/79	2115	20.2	8.0	10.8	45.	238.	62.	330.	22.	194.
1/29/79	2130	20.2	8.0	11.0	36.	238.	50.	330.	18.	194.
1/29/79	2145	20.2	7.8	11.3	36.	245.	49.	335.	18.	197.
1/29/79	2200	20.5	7.0	11.3	48.	234.	62.	301.	22.	177.
1/29/79	2215	20.5	7.4	11.3	65.	233.	86.	309.	31.	181.
1/29/79	2230	20.5	6.9	11.8	75.	232.	96.	297.	34.	174.
1/29/79	2245	20.5	7.0	11.8	110.	233.	142.	300.	51.	176.
1/29/79	2300	20.5	7.0	12.1	65.	235.	84.	303.	30.	178.
1/29/79	2315	20.5	7.3	11.5	85.	232.	112.	305.	40.	179.
1/29/79	2330	20.5	7.3	11.8	66.	234.	87.	308.	31.	181.
1/29/79	2345	20.5	7.0	11.5	42.	233.	54.	300.	19.	176.
1/29/79	2400	21.4	8.0	11.3	65.	234.	90.	325.	32.	191.

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**                                 15 MIN. DATA                              **
**                          DRY STACK GAS CONCENTRATION                      **
**                                                                           **
**                             O2     CO2     CO     NO     CO     NO    CO    NO    **
**                     LOAD   VOL%   VOL%   PPMV   PPMV   PPMV   PPMV   NG/J  NG/J  **
**   DATE      TIME    MWTH   MEAS   MEAS   MEAS   MEAS   3%O2   3%O2              **
*******************************************************************************
** 1/30/79       15   21.4    7.1   11.8    45.   233.    58.   302.    21.   177.  **
** 1/30/79       30   21.4    6.9   11.8    75.   226.    96.   289.    34.   170.  **
** 1/30/79       45   21.4    7.0   11.8   120.   224.   155.   288.    55.   169.  **
** 1/30/79      100   21.1    7.1   11.8   130.   220.   169.   285.    60.   168.  **
** 1/30/79      115   21.1    7.0   11.8   200.   205.   258.   264.    92.   155.  **
** 1/30/79      130   21.1    7.4   11.8   200.   220.   265.   292.    95.   171.  **
** 1/30/79      145   21.1    7.0   11.5   220.   216.   283.   278.   101.   163.  **
** 1/30/79      200   21.4    7.0   11.8    40.   220.    52.   283.    18.   166.  **
** 1/30/79      215   21.4    7.5   11.3    42.   220.    56.   294.    20.   173.  **
** 1/30/79      230   21.4    7.9   11.0   100.   226.   138.   311.    49.   183.  **
** 1/30/79      245   21.4    6.7   12.3    46.   220.    58.   277.    21.   163.  **
** 1/30/79      300   20.5    5.9   12.9    56.   224.    67.   267.    24.   157.  **
** 1/30/79      315   20.5    6.4   12.6    49.   220.    60.   272.    22.   159.  **
** 1/30/79      330   20.5    6.3   12.6    48.   218.    59.   267.    21.   157.  **
** 1/30/79      345   20.5    6.5   12.3    46.   218.    57.   271.    20.   159.  **
** 1/30/79      400   22.0    6.9   12.1    60.   218.    77.   279.    27.   164.  **
** 1/30/79      415   22.0    6.4   12.6    46.   212.    57.   262.    20.   154.  **
** 1/30/79      430   22.0    6.2   12.6    45.   190.    55.   231.    20.   136.  **
** 1/30/79      445   22.0    8.8   10.0    56.   220.    83.   325.    30.   191.  **
** 1/30/79      500   19.9    7.5   12.1    85.   205.   114.   274.    41.   161.  **
** 1/30/79      515   19.9    6.5   12.9    42.   220.    52.   273.    19.   161.  **
** 1/30/79      530   19.9    7.0   12.1    42.   220.    54.   283.    19.   166.  **
** 1/30/79      545   19.9    7.3   11.3    52.   220.    68.   290.    24.   170.  **
** 1/30/79      600   20.8    6.7   12.1    50.   216.    63.   272.    23.   160.  **
** 1/30/79      615   20.8    6.6   12.3    50.   219.    63.   274.    22.   161.  **
** 1/30/79      630   20.8    7.0   12.1    42.   219.    54.   282.    19.   166.  **
** 1/30/79      645   20.8    7.3   11.5    44.   218.    58.   287.    21.   168.  **
** 1/30/79      700   20.5    7.5   11.3    42.   218.    56.   291.    20.   171.  **
** 1/30/79      715   20.5    7.3   11.5    42.   216.    55.   284.    20.   167.  **
** 1/30/79      730   20.5    7.2   11.5    42.   219.    55.   286.    20.   168.  **
** 1/30/79      745   20.5    7.4   11.3    50.   218.    66.   289.    24.   170.  **
** 1/30/79      800   20.5    7.2   11.5    43.   218.    56.   285.    20.   167.  **
** 1/30/79      815   20.5    7.2   11.5    70.   205.    91.   268.    33.   157.  **
** 1/30/79      830   20.5    7.4   11.0    60.   212.    80.   281.    28.   165.  **
** 1/30/79      845   20.5    7.3   11.5    20.   222.    26.   292.     9.   172.  **
** 1/30/79      900   20.5    7.4   11.3    50.   222.    66.   294.    24.   173.  **
** 1/30/79      915   20.5    7.3   12.1    45.   222.    59.   292.    21.   172.  **
** 1/30/79      930   20.5    7.3   12.1    45.   224.    59.   295.    21.   173.  **
** 1/30/79      945   20.5    7.3   12.1    45.   225.    59.   296.    21.   174.  **
** 1/30/79     1000   20.5    7.6   12.1    42.   215.    57.   289.    20.   170.  **
** 1/30/79     1015   20.5    8.8   10.3    50.   225.    74.   333.    26.   195.  **
** 1/30/79     1030   20.5    7.2   12.3   100.   218.   131.   285.    47.   167.  **
** 1/30/79     1045   20.5    6.1   12.6   100.   216.   121.   261.    43.   153.  **
** 1/30/79     1100   22.0    6.2   13.5    58.   221.    71.   269.    25.   158.  **
** 1/30/79     1115   22.0    6.5   13.5    34.   222.    42.   276.    15.   162.  **
** 1/30/79     1130   22.0    7.0   12.6    33.   228.    42.   294.    15.   172.  **
** 1/30/79     1145   22.0    7.5   12.1    36.   230.    48.   307.    17.   180.  **
** 1/30/79     1200   20.5    6.7   12.6    50.   225.    63.   284.    23.   167.  **
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**                                        15 MIN. DATA                                             **
**                               DRY STACK GAS CONCENTRATION                                       **
**                                                                                                 **
**                              O2      CO2      CO       NO       CO       NO       CO      NO    **
**                      LOAD   VOL%    VOL%     PPMV     PPMV     PPMV     PPMV     NG/J    NG/J   **
**    DATE      TIME    MWTH   MEAS    MEAS     MEAS     MEAS     3%O2     3%O2                    **
*****************************************************************************************************
** 1/30/79      1215    20.5    6.7    12.6     100.     210.     126.     265.      45.    155.   **
** 1/30/79      1230    20.5    7.0    12.6     250.     220.     322.     283.     115.    166.   **
** 1/30/79      1245    20.5    6.8    13.8      39.     228.      50.     289.      18.    170.   **
** 1/30/79      1300    22.0    7.7    12.1      40.     229.      54.     311.      19.    182.   **
** 1/30/79      1315    22.0    7.7    11.8      46.     226.      62.     306.      22.    180.   **
** 1/30/79      1330    22.0    7.6    11.8      55.     225.      74.     303.      26.    178.   **
** 1/30/79      1345    22.0    7.3    12.3      42.     232.      55.     305.      20.    179.   **
** 1/30/79      1400    20.5    7.5    12.1      42.     232.      56.     310.      20.    182.   **
** 1/30/79      1415    20.5    7.7    11.8      42.     232.      57.     315.      20.    185.   **
** 1/30/79      1430    20.5    7.6    11.8      42.     242.      57.     326.      20.    191.   **
** 1/30/79      1445    20.5    8.0    11.3      42.     242.      58.     336.      21.    197.   **
** 1/30/79      1500    20.5    7.5    11.8      40.     240.      53.     321.      19.    188.   **
** 1/30/79      1515    20.5    7.2    12.3      42.     234.      55.     306.      20.    180.   **
** 1/30/79      1530    20.5    6.9    12.6      45.     235.      58.     300.      21.    176.   **
** 1/30/79      1545    20.5    7.0    12.1      41.     230.      53.     296.      19.    174.   **
** 1/30/79      1600    20.5    7.3    12.6      44.     230.      58.     303.      21.    178.   **
** 1/30/79      1615    20.5    7.1    12.9      44.     230.      57.     298.      20.    175.   **
** 1/30/79      1630    20.5    7.2    12.3      42.     230.      55.     301.      20.    176.   **
** 1/30/79      1645    20.5    6.8    12.3      42.     225.      53.     286.      19.    168.   **
** 1/30/79      1700    22.0    6.6    12.9     100.     220.     125.     275.      45.    162.   **
** 1/30/79      1715    22.0    6.8    12.6     110.     210.     140.     267.      50.    157.   **
** 1/30/79      1730    22.0    7.0    12.3      46.     214.      59.     276.      21.    162.   **
** 1/30/79      1745    22.0    8.0    11.3      60.     212.      83.     298.      30.    173.   **
** 1/30/79      1800    20.5    7.5    11.5      70.     222.      94.     297.      33.    174.   **
** 1/30/79      1815    20.5    7.0    12.3      75.     222.      97.     286.      35.    168.   **
** 1/30/79      1830    20.5    6.9    12.9      55.     222.      70.     284.      25.    167.   **
** 1/30/79      1845    20.5    7.0    12.3      45.     228.      58.     294.      21.    172.   **
** 1/30/79      1900    20.5    7.3    12.3      75.     220.      99.     290.      35.    170.   **
** 1/30/79      1915    20.5    6.6    12.6     100.     210.     125.     263.      45.    154.   **
** 1/30/79      1930    20.5    6.0    13.5     125.     210.     150.     252.      54.    148.   **
** 1/30/79      1945    20.5    6.1    13.5      50.     210.      60.     254.      22.    149.   **
** 1/30/79      2000    21.4    7.5    11.8      45.     230.      60.     307.      21.    180.   **
** 1/30/79      2015    21.4    7.4    11.5      45.     230.      60.     305.      21.    179.   **
** 1/30/79      2030    21.4    7.7    12.1      45.     234.      61.     317.      22.    186.   **
** 1/30/79      2045    21.4    7.5    11.5      50.     235.      67.     314.      24.    184.   **
** 1/30/79      2100    22.0    7.0    12.1      58.     236.      75.     304.      27.    178.   **
** 1/30/79      2115    22.0    6.9    12.6      55.     239.      70.     306.      25.    179.   **
** 1/30/79      2130    22.0    6.8    12.6      65.     242.      83.     307.      29.    180.   **
** 1/30/79      2145    22.0    6.7    12.9      80.     239.     101.     301.      36.    177.   **
** 1/30/79      2200    20.5    6.4    13.2     200.     232.     247.     286.      88.    168.   **
** 1/30/79      2215    20.5    6.0    13.5      90.     232.     108.     279.      39.    164.   **
** 1/30/79      2230    20.5    6.2    13.2      48.     234.      58.     285.      21.    167.   **
** 1/30/79      2245    20.5    6.7    12.6      60.     228.      76.     287.      27.    169.   **
** 1/30/79      2300    22.3    6.9    12.6      60.     222.      77.     284.      27.    167.   **
** 1/30/79      2315    22.3    6.7    12.6      40.     220.      50.     277.      18.    163.   **
** 1/30/79      2330    22.3    7.2    11.8      40.     235.      52.     307.      19.    180.   **
** 1/30/79      2345    22.3    8.0    10.8      40.     222.      56.     308.      20.    181.   **
** 1/30/79      2400    22.0    7.3    11.8      40.     220.      53.     290.      19.    170.   **
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15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
1/31/79	15	22.0	7.6	11.5	45.	222.	61.	299.	22.	175.
1/31/79	30	22.0	8.9	10.0	45.	221.	67.	330.	24.	194.
1/31/79	45	22.0	7.2	11.5	44.	222.	57.	290.	21.	170.
1/31/79	100	20.5	7.1	12.1	50.	228.	65.	296.	23.	174.
1/31/79	115	20.5	7.2	12.1	50.	220.	65.	287.	23.	169.
1/31/79	130	20.5	8.0	11.8	50.	220.	69.	305.	25.	179.
1/31/79	145	20.5	7.7	11.3	42.	228.	57.	309.	20.	182.
1/31/79	200	21.1	7.4	11.8	43.	229.	57.	304.	20.	178.
1/31/79	215	21.1	7.3	11.8	42.	226.	55.	297.	20.	175.
1/31/79	230	21.1	7.3	12.1	40.	230.	53.	303.	19.	178.
1/31/79	245	21.1	7.3	12.1	42.	230.	55.	303.	20.	178.
1/31/79	300	20.8	7.3	12.6	42.	230.	55.	303.	20.	178.
1/31/79	315	20.8	7.6	11.8	42.	228.	57.	307.	20.	180.
1/31/79	330	20.8	7.3	12.1	44.	226.	58.	297.	21.	175.
1/31/79	345	20.8	7.3	12.1	42.	230.	55.	303.	20.	178.
1/31/79	400	22.0	7.3	12.1	43.	224.	57.	295.	20.	173.
1/31/79	415	22.0	7.4	11.8	45.	222.	60.	294.	21.	173.
1/31/79	430	22.0	6.7	12.3	45.	222.	57.	280.	20.	164.
1/31/79	445	22.0	8.0	10.8	42.	224.	58.	311.	21.	182.
1/31/79	500	20.5	8.5	11.0	42.	218.	61.	315.	22.	185.
1/31/79	515	20.5	8.5	10.8	45.	216.	65.	312.	23.	183.
1/31/79	530	20.5	8.3	11.0	50.	216.	71.	307.	25.	180.
1/31/79	545	20.5	6.7	12.6	70.	212.	88.	267.	32.	157.
1/31/79	600	22.9	6.5	12.6	75.	215.	93.	267.	33.	157.
1/31/79	615	22.9	6.7	12.6	62.	218.	78.	275.	28.	161.
1/31/79	630	22.9	6.8	12.3	65.	218.	83.	277.	29.	162.
1/31/79	645	22.9	7.5	11.8	42.	220.	56.	294.	20.	173.
1/31/79	700	20.5	7.5	11.5	43.	222.	57.	297.	21.	174.
1/31/79	715	20.5	7.5	11.8	42.	222.	56.	297.	20.	174.
1/31/79	730	20.5	7.8	11.8	42.	225.	57.	307.	21.	181.
1/31/79	745	20.5	8.4	11.3	42.	228.	60.	326.	21.	192.
1/31/79	800	20.5	7.5	12.1	38.	229.	51.	306.	18.	180.
1/31/79	815	20.5	7.5	11.8	37.	228.	49.	305.	18.	179.
1/31/79	830	20.5	7.5	11.5	36.	222.	48.	297.	17.	174.
1/31/79	845	20.5	8.0	11.3	40.	210.	56.	291.	20.	171.
1/31/79	900	20.8	8.3	11.0	50.	205.	71.	291.	25.	171.
1/31/79	915	20.8	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
1/31/79	930	20.8	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
1/31/79	945	20.8	7.2	12.6	45.	210.	59.	274.	21.	161.
1/31/79	1000	20.5	6.9	12.3	52.	210.	66.	268.	24.	158.
1/31/79	1015	20.5	7.0	11.8	45.	212.	58.	273.	21.	160.
1/31/79	1030	20.5	7.1	12.3	42.	215.	54.	279.	19.	164.
1/31/79	1045	20.5	7.5	11.5	42.	218.	56.	291.	20.	171.
1/31/79	1100	16.1	7.5	11.3	42.	232.	56.	310.	20.	182.
1/31/79	1115	16.1	7.5	11.5	42.	235.	56.	314.	20.	184.
1/31/79	1130	16.1	7.6	11.8	42.	238.	57.	320.	20.	188.
1/31/79	1145	16.1	7.8	11.5	45.	220.	61.	301.	22.	176.
1/31/79	1200	20.5	9.8	9.1	45.	215.	73.	347.	26.	204.

15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
1/31/79	1215	20.5	9.8	9.1	43.	220.	69.	355.	25.	208.
1/31/79	1230	20.5	8.3	10.8	43.	215.	61.	305.	22.	179.
1/31/79	1245	20.5	8.5	10.0	70.	210.	101.	303.	36.	178.
1/31/79	1300	20.5	7.5	11.8	55.	205.	73.	274.	26.	161.
1/31/79	1315	20.5	8.0	11.0	50.	205.	69.	284.	25.	167.
1/31/79	1330	20.5	7.0	12.1	50.	210.	64.	270.	23.	159.
1/31/79	1345	20.5	7.2	11.8	90.	208.	118.	272.	42.	160.
1/31/79	1400	21.1	6.9	12.6	45.	215.	58.	275.	21.	161.
1/31/79	1415	21.1	8.0	11.5	60.	220.	83.	305.	30.	179.
1/31/79	1430	21.1	7.4	11.8	60.	215.	80.	285.	28.	167.
1/31/79	1445	21.1	7.4	11.0	55.	220.	73.	292.	26.	171.
1/31/79	1500	18.2	7.6	11.8	50.	215.	67.	289.	24.	170.
1/31/79	1515	18.2	7.5	11.8	55.	215.	73.	287.	26.	169.
1/31/79	1530	18.2	7.8	11.3	55.	212.	75.	290.	27.	170.
1/31/79	1545	18.2	7.9	11.0	52.	220.	72.	303.	26.	178.
1/31/79	1600	20.5	8.5	10.5	42.	215.	61.	310.	22.	182.
1/31/79	1615	20.5	8.7	9.8	43.	200.	63.	293.	23.	172.
1/31/79	1630	20.5	9.3	8.9	43.	200.	66.	309.	24.	181.
1/31/79	1645	20.5	8.9	10.0	42.	200.	63.	298.	22.	175.
1/31/79	1700	20.5	8.8	10.5	45.	200.	67.	296.	24.	178.
1/31/79	1715	20.5	8.8	10.5	45.	205.	67.	303.	24.	178.
1/31/79	1730	20.5	8.5	10.8	45.	212.	65.	306.	23.	180.
1/31/79	1745	20.5	8.1	10.3	45.	212.	63.	296.	22.	178.
1/31/79	1800	20.5	7.6	11.3	44.	215.	59.	289.	21.	170.
1/31/79	1815	20.5	7.9	11.5	45.	218.	62.	300.	22.	176.
1/31/79	1830	20.5	8.1	11.0	50.	218.	70.	305.	25.	179.
1/31/79	1845	20.5	8.0	10.8	48.	220.	67.	305.	24.	179.
1/31/79	1900	20.5	6.3	11.0	48.	220.	59.	270.	21.	158.
1/31/79	1915	20.5	6.0	11.0	50.	220.	60.	264.	21.	155.
1/31/79	1930	20.5	6.2	11.0	50.	222.	61.	270.	22.	159.
1/31/79	1945	20.5	5.9	11.3	50.	225.	60.	268.	21.	158.
1/31/79	2000	20.8	5.7	11.0	50.	225.	59.	265.	21.	156.
1/31/79	2015	20.8	6.5	10.8	50.	226.	62.	281.	22.	165.
1/31/79	2030	20.8	6.6	11.5	49.	220.	61.	275.	22.	162.
1/31/79	2045	20.8	5.8	11.8	48.	230.	57.	273.	20.	160.
1/31/79	2100	22.3	6.0	11.0	48.	240.	58.	288.	21.	169.
1/31/79	2115	22.3	6.0	11.5	49.	238.	59.	286.	21.	168.
1/31/79	2130	22.3	6.4	11.3	49.	240.	60.	296.	22.	174.
1/31/79	2145	22.3	5.9	11.5	49.	240.	58.	286.	21.	168.
1/31/79	2200	20.5	5.3	11.8	100.	232.	115.	266.	41.	156.
1/31/79	2215	20.5	5.3	12.1	100.	238.	115.	273.	41.	160.
1/31/79	2230	20.5	5.3	12.6	50.	233.	57.	267.	21.	157.
1/31/79	2245	20.5	5.9	12.1	42.	230.	50.	274.	18.	161.
1/31/79	2300	19.9	6.5	11.3	43.	224.	53.	278.	19.	163.
1/31/79	2315	19.9	6.9	11.0	44.	220.	56.	281.	20.	165.
1/31/79	2330	19.9	6.7	11.0	45.	215.	57.	271.	20.	159.
1/31/79	2345	19.9	6.8	10.8	42.	215.	53.	273.	19.	160.
1/31/79	2400	20.8	6.5	11.3	42.	224.	52.	278.	19.	163.

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**                                      15 MIN. DATA                                              **
**                               DRY STACK GAS CONCENTRATION                                      **
**                                                                                                **
**                              O2      CO2      CO      NO      CO      NO      CO      NO       **
**                      LOAD   VOL%    VOL%    PPMV    PPMV    PPMV    PPMV    NG/J    NG/J       **
**    DATE     TIME     MWTH   MEAS    MEAS    MEAS    MEAS    3%O2    3%O2                       **
****************************************************************************************************
** 2/ 1/79       15     20.8    7.0    10.5     42.    222.     54.    286.     19.    168.       **
** 2/ 1/79       30     20.8    6.9    10.5     42.    220.     54.    281.     19.    165.       **
** 2/ 1/79       45     20.8    6.4    11.3     62.    225.     77.    278.     27.    163.       **
** 2/ 1/79      100     20.5    6.5    11.3     64.    210.     80.    261.     28.    153.       **
** 2/ 1/79      115     20.5    7.0    11.0     55.    200.     71.    258.     25.    151.       **
** 2/ 1/79      130     20.5   -1.0    11.0     42.     -1.     36.     -1.     13.     -1.       **
** 2/ 1/79      145     20.5   -1.0     9.8     43.     -1.     37.     -1.     13.     -1.       **
** 2/ 1/79      200     20.8   -1.0     9.3     28.     -1.     24.     -1.      9.     -1.       **
** 2/ 1/79      215       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 0/ 0/79        0       .0     .0      .0      0.      0.      0.      0.      0.      0.       **
** 2/ 1/79     1100     20.5    6.8    12.3     42.    240.     53.    305.     19.    179.       **
** 2/ 1/79     1115     20.5    6.6    12.1     45.    239.     56.    299.     20.    176.       **
** 2/ 1/79     1130     20.5    7.0    11.5     48.    238.     62.    306.     22.    180.       **
** 2/ 1/79     1145     20.5    7.3    11.5     52.    226.     68.    297.     24.    175.       **
** 2/ 1/79     1200     22.0    7.1    11.5     50.    232.     65.    301.     23.    177.       **
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15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
2/ 1/79	1215	22.0	7.5	11.5	55.	232.	73.	310.	26.	182.
2/ 1/79	1230	22.0	7.0	11.5	52.	237.	67.	305.	28.	179.
2/ 1/79	1245	22.0	6.3	12.6	54.	236.	66.	289.	24.	170.
2/ 1/79	1300	20.8	6.4	11.8	52.	231.	64.	285.	23.	167.
2/ 1/79	1315	20.8	6.0	12.3	60.	215.	72.	258.	26.	152.
2/ 1/79	1330	20.8	5.3	13.5	300.	226.	344.	259.	123.	152.
2/ 1/79	1345	20.8	5.2	12.9	260.	228.	296.	260.	106.	153.
2/ 1/79	1400	20.5	5.9	12.3	100.	232.	119.	277.	43.	163.
2/ 1/79	1415	20.5	6.5	12.1	46.	234.	57.	291.	20.	171.
2/ 1/79	1430	20.5	6.7	12.1	44.	234.	55.	295.	20.	173.
2/ 1/79	1445	20.5	7.0	11.8	48.	234.	62.	301.	22.	177.
2/ 1/79	1500	20.8	7.1	11.5	50.	232.	65.	301.	23.	177.
2/ 1/79	1515	20.8	6.3	12.3	48.	233.	59.	286.	21.	168.
2/ 1/79	1530	20.8	7.0	11.8	54.	232.	70.	299.	25.	175.
2/ 1/79	1545	20.8	6.3	12.3	63.	234.	77.	287.	28.	168.
2/ 1/79	1600	20.8	6.0	12.6	60.	235.	72.	282.	26.	166.
2/ 1/79	1615	20.8	6.0	12.3	65.	233.	78.	280.	28.	164.
2/ 1/79	1630	20.8	6.5	12.3	50.	224.	62.	279.	22.	163.
2/ 1/79	1645	20.8	7.4	11.3	54.	229.	72.	304.	26.	178.
2/ 1/79	1700	20.8	7.0	11.5	52.	220.	67.	283.	24.	166.
2/ 1/79	1715	20.8	6.5	12.3	52.	220.	65.	273.	23.	161.
2/ 1/79	1730	20.8	6.3	12.3	44.	220.	54.	270.	19.	158.
2/ 1/79	1745	20.8	6.5	12.6	50.	224.	62.	278.	22.	163.
2/ 1/79	1800	21.1	6.5	12.1	55.	224.	68.	278.	24.	163.
2/ 1/79	1815	21.1	6.3	12.1	52.	226.	64.	277.	23.	163.
2/ 1/79	1830	21.1	6.5	12.1	49.	225.	61.	280.	22.	164.
2/ 1/79	1845	21.1	6.2	12.3	44.	225.	54.	274.	19.	161.
2/ 1/79	1900	21.4	6.4	12.3	44.	228.	54.	281.	19.	165.
2/ 1/79	1915	21.4	6.5	12.3	44.	225.	55.	280.	20.	164.
2/ 1/79	1930	21.4	6.4	12.1	44.	225.	54.	278.	19.	163.
2/ 1/79	1945	21.4	6.3	12.1	44.	225.	54.	276.	19.	162.
2/ 1/79	2000	21.4	6.3	12.3	44.	222.	54.	272.	19.	160.
2/ 1/79	2015	21.4	6.2	12.3	41.	227.	50.	276.	18.	162.
2/ 1/79	2030	21.4	6.1	12.6	46.	220.	56.	266.	20.	156.
2/ 1/79	2045	21.4	6.4	12.3	55.	228.	68.	281.	24.	165.
2/ 1/79	2100	21.4	6.1	12.1	49.	230.	59.	278.	21.	163.
2/ 1/79	2115	21.4	6.3	12.6	44.	230.	54.	282.	19.	166.
2/ 1/79	2130	21.4	6.3	12.3	44.	238.	54.	292.	19.	171.
2/ 1/79	2145	21.4	6.7	12.1	42.	240.	53.	303.	19.	178.
2/ 1/79	2200	22.0	6.7	11.8	42.	237.	53.	299.	19.	175.
2/ 1/79	2215	22.0	6.4	12.1	42.	233.	52.	288.	19.	169.
2/ 1/79	2230	22.0	6.3	12.1	43.	233.	53.	286.	19.	168.
2/ 1/79	2245	22.0	6.5	12.1	46.	229.	57.	285.	20.	167.
2/ 1/79	2300	21.4	6.1	12.1	40.	225.	48.	272.	17.	160.
2/ 1/79	2315	21.4	6.5	12.1	100.	222.	124.	276.	44.	162.
2/ 1/79	2330	21.4	5.9	12.9	120.	221.	143.	264.	51.	155.
2/ 1/79	2345	21.4	6.2	12.6	59.	218.	72.	265.	26.	156.
2/ 1/79	2400	21.1	6.2	12.6	55.	215.	67.	262.	24.	154.

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**                                                                                                  **
**                                         15 MIN. DATA                                             **
**                                  DRY STACK GAS CONCENTRATION                                     **
**                                                                                                  **
**                            O2      CO2     CO      NO      CO      NO      CO      NO            **
**                   LOAD    VOL%    VOL%    PPMV    PPMV    PPMV    PPMV    NG/J    NG/J           **
**   DATE      TIME  MWTH    MEAS    MEAS    MEAS    MEAS    3%O2    3%O2                           **
******************************************************************************************************
** 2/ 2/79       15  21.1     6.3    12.3     60.    212.     74.    260.     26.    153.           **
** 2/ 2/79       30  21.1     6.2    12.3     52.    218.     63.    265.     23.    156.           **
** 2/ 2/79       45  21.1     6.3    12.3     45.    225.     55.    276.     20.    162.           **
** 2/ 2/79      100  20.5     7.3    11.3     55.    230.     72.    303.     26.    178.           **
** 2/ 2/79      115  20.5     6.7    12.1     55.    230.     69.    290.     25.    170.           **
** 2/ 2/79      130  20.5     6.9    11.8     55.    225.     70.    288.     25.    169.           **
** 2/ 2/79      145  20.5     6.6    11.8     55.    232.     69.    290.     25.    171.           **
** 2/ 2/79      200  20.5     6.5    12.1     52.    239.     65.    297.     23.    174.           **
** 2/ 2/79      215  20.5     6.4    12.1     50.    235.     62.    290.     22.    170.           **
** 2/ 2/79      230  20.5     6.4    12.1     50.    235.     62.    290.     22.    170.           **
** 2/ 2/79      245  20.5     5.8    12.3     59.    224.     70.    266.     25.    156.           **
** 2/ 2/79      300  20.5     5.8    12.9     65.    222.     77.    263.     28.    155.           **
** 2/ 2/79      315  20.5     5.8    12.9     75.    218.     89.    258.     32.    152.           **
** 2/ 2/79      330  20.5     5.8    12.6    110.    212.    130.    251.     47.    148.           **
** 2/ 2/79      345  20.5     5.5    12.9    150.    210.    178.    244.     62.    143.           **
** 2/ 2/79      400  21.1     5.4    13.2    200.    212.    231.    245.     83.    148.           **
** 2/ 2/79      415  21.1     6.6    12.6     75.    215.     94.    269.     34.    158.           **
** 2/ 2/79      430  21.1     6.6    12.1     62.    210.     78.    263.     28.    154.           **
** 2/ 2/79      445  21.1     5.9    12.1    100.    205.    119.    245.     43.    148.           **
** 2/ 2/79      500  20.5     6.1    12.6    290.    210.    351.    254.    125.    149.           **
** 2/ 2/79      515  20.5     6.0    12.6    125.    208.    150.    250.     54.    147.           **
** 2/ 2/79      530  20.5     7.1    12.1     44.    210.     57.    272.     20.    160.           **
** 2/ 2/79      545  20.5     7.5    11.3     43.    210.     57.    281.     21.    165.           **
** 2/ 2/79      600  20.2     7.2    11.3     43.    215.     56.    281.     20.    165.           **
** 2/ 2/79      615  20.2     6.9    11.5     44.    212.     56.    271.     20.    159.           **
** 2/ 2/79      630  20.2     7.2    11.5     42.    215.     55.    281.     20.    165.           **
** 2/ 2/79      645  20.2     7.3    11.3     45.    215.     59.    283.     21.    166.           **
** 2/ 2/79      700  20.5     7.0    11.3     45.    215.     58.    277.     21.    163.           **
** 2/ 2/79      715  20.5     7.1    11.5     45.    218.     58.    283.     21.    166.           **
** 2/ 2/79      730  20.5     7.3    11.3     49.    221.     64.    291.     23.    171.           **
** 2/ 2/79      745  20.5     7.0    11.3     50.    222.     64.    286.     23.    168.           **
** 2/ 2/79      800  20.5     6.9    11.5     43.    224.     55.    286.     20.    168.           **
** 2/ 2/79      815  20.5     6.7    11.5     46.    215.     58.    271.     21.    159.           **
** 2/ 2/79      830  20.5     6.0    12.3     90.    218.    108.    262.     39.    154.           **
** 2/ 2/79      845  20.5     7.9    11.0     43.    224.     59.    308.     21.    181.           **
** 2/ 2/79      900  20.5     7.8    11.0     44.    225.     60.    307.     21.    181.           **
** 2/ 2/79      915  20.5     7.8    11.0     42.    220.     57.    301.     21.    176.           **
** 2/ 2/79      930  20.5     7.8    10.8     45.    220.     61.    301.     22.    176.           **
** 2/ 2/79      945  20.5     7.5    11.3     48.    225.     64.    301.     23.    176.           **
** 2/ 2/79     1000  19.0     7.3    11.3     50.    228.     66.    300.     24.    176.           **
** 2/ 2/79     1015  19.0     7.0    11.3     50.    210.     64.    270.     23.    159.           **
** 2/ 2/79     1030  19.0     6.7    11.8     52.    230.     66.    290.     23.    170.           **
** 2/ 2/79     1045  19.0     9.0    10.0    130.    200.    196.    301.     70.    177.           **
** 2/ 2/79     1100  20.5     6.2    12.6     58.    215.     71.    262.     25.    154.           **
** 2/ 2/79     1115  20.5     5.9    12.6     56.    210.     67.    251.     24.    147.           **
** 2/ 2/79     1130  20.5     6.1    12.6     60.    215.     73.    260.     26.    153.           **
** 2/ 2/79     1145  20.5     6.0    12.6     50.    215.     60.    258.     21.    152.           **
** 2/ 2/79     1200  20.8     6.3    12.6     50.    212.     61.    260.     22.    153.           **
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**                                  15 MIN. DATA                                   **
**                          DRY STACK GAS CONCENTRATION                            **
**                                                                                 **
**                               O2     CO2     CO     NO     CO     NO     CO     NO      **
**                       LOAD   VOL%   VOL%   PPMV   PPMV   PPMV   PPMV   NG/J   NG/J     **
**   DATE      TIME     MWTH    MEAS   MEAS   MEAS   MEAS   3%O2   3%O2                    **
*************************************************************************************
** 2/ 2/79    1215   20.8     6.9   12.1    48.   210.    61.   268.    22.   158.   **
** 2/ 2/79    1230   20.8     7.0   11.8    48.   210.    62.   270.    22.   159.   **
** 2/ 2/79    1245   20.8     6.9   11.8    46.   208.    59.   266.    21.   156.   **
** 2/ 2/79    1300   20.5     7.4   11.3    50.   220.    66.   292.    24.   171.   **
** 2/ 2/79    1315   20.5     7.3   11.3    50.   220.    66.   290.    24.   170.   **
** 2/ 2/79    1330   20.5     6.2   12.3    50.   220.    61.   268.    22.   157.   **
** 2/ 2/79    1345   20.5     7.0   11.5    55.   276.    71.   355.    25.   209.   **
** 2/ 2/79    1400   20.5     6.9   11.5    60.   222.    77.   284.    27.   167.   **
** 2/ 2/79    1415   20.5     6.8   11.8    60.   225.    76.   286.    27.   168.   **
** 2/ 2/79    1430   20.5     6.8   11.8    56.   230.    71.   292.    25.   171.   **
** 2/ 2/79    1445   20.5     6.9   11.8    45.   225.    58.   288.    21.   169.   **
** 2/ 2/79    1500   20.5     7.0   11.5    45.   230.    58.   296.    21.   174.   **
** 2/ 2/79    1515   20.5     7.0   11.5    48.   230.    62.   296.    22.   174.   **
** 2/ 2/79    1530   20.5     6.9   11.5    50.   230.    64.   294.    23.   173.   **
** 2/ 2/79    1545   20.5     6.8   11.8    48.   230.    61.   292.    22.   171.   **
** 2/ 2/79    1600   20.5     6.8   11.8    44.   229.    56.   291.    20.   171.   **
** 2/ 2/79    1615   20.5     7.0   11.5    45.   226.    58.   291.    21.   171.   **
** 2/ 2/79    1630   20.5     7.2   11.3    45.   225.    59.   294.    21.   173.   **
** 2/ 2/79    1645   20.5     7.4   11.3    46.   222.    61.   294.    22.   173.   **
** 2/ 2/79    1700   20.5     6.9   11.8    43.   222.    55.   284.    20.   167.   **
** 2/ 2/79    1715   20.5     6.8   11.8    45.   200.    57.   254.    20.   149.   **
** 2/ 2/79    1730   20.5     5.4   13.2   200.   190.   231.   219.    83.   129.   **
** 2/ 2/79    1745   20.5     5.3   13.2   100.   200.   115.   229.    41.   135.   **
** 2/ 2/79    1800   20.5     6.5   12.6    70.   210.    87.   261.    31.   153.   **
** 2/ 2/79    1815   20.5     6.7   12.1    45.   210.    57.   265.    20.   155.   **
** 2/ 2/79    1830   20.5     6.7   12.1    45.   208.    57.   262.    20.   154.   **
** 2/ 2/79    1845   20.5     6.5   12.1   100.   208.   124.   259.    44.   152.   **
** 2/ 2/79    1900   20.5     6.5   12.1    90.   210.   112.   261.    40.   153.   **
** 2/ 2/79    1915   20.5     6.9   11.5    50.   210.    64.   268.    23.   158.   **
** 2/ 2/79    1930   20.5     7.3   11.3    40.   198.    53.   261.    19.   153.   **
** 2/ 2/79    1945   20.5     8.3   10.8    60.   200.    85.   284.    30.   167.   **
** 2/ 2/79    2000   17.6     9.5    9.3    55.   210.    86.   330.    31.   194.   **
** 2/ 2/79    2015   17.6     8.5    9.8    55.   210.    79.   303.    28.   178.   **
** 2/ 2/79    2030   17.6     7.1   11.0    52.   210.    67.   272.    24.   160.   **
** 2/ 2/79    2045   17.6     6.6   11.8    58.   212.    73.   265.    26.   156.   **
** 2/ 2/79    2100   20.8     6.1   12.3    62.   210.    75.   254.    27.   149.   **
** 2/ 2/79    2115   20.8     6.5   12.6    60.   220.    75.   273.    27.   161.   **
** 2/ 2/79    2130   20.8     6.4   12.3    60.   222.    74.   274.    26.   161.   **
** 2/ 2/79    2145   20.8     6.4   12.3    60.   228.    74.   281.    26.   165.   **
** 2/ 2/79    2200   20.5     6.7   12.1    60.   230.    76.   290.    27.   170.   **
** 2/ 2/79    2215   20.5     6.5   12.1    60.   234.    75.   291.    27.   171.   **
** 2/ 2/79    2230   20.5     6.4   12.1    55.   230.    68.   284.    24.   167.   **
** 2/ 2/79    2245   20.5     7.4   11.3    50.   230.    66.   305.    24.   179.   **
** 2/ 2/79    2300   20.5     7.4   11.3    52.   225.    69.   298.    25.   175.   **
** 2/ 2/79    2315   20.5     5.9   12.6    54.   220.    64.   263.    23.   154.   **
** 2/ 2/79    2330   20.5     5.9   12.6    70.   215.    84.   257.    30.   151.   **
** 2/ 2/79    2345   20.5     6.0   12.3    68.   215.    82.   258.    29.   152.   **
** 2/ 2/79    2400   22.9     6.0   12.6   100.   212.   120.   255.    43.   150.   **
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**                                   15 MIN. DATA                                          **
**                          DRY STACK GAS CONCENTRATION                                    **
**                                                                                         **
**                           O2      CO2      CO      NO      CO      NO      CO      NO   **
**                   LOAD   VOL%    VOL%    PPMV    PPMV    PPMV    PPMV    NG/J    NG/J   **
**   DATE     TIME   MWTH   MEAS    MEAS    MEAS    MEAS    3%O2    3%O2                   **
*********************************************************************************************
** 2/ 3/79      15   22.9    6.0    12.6    130.    212.    156.    255.     56.    150.   **
** 2/ 3/79      30   22.9    5.7    12.9    300.    210.    353.    247.    126.    145.   **
** 2/ 3/79      45   22.9    5.9    12.6    300.    210.    358.    251.    128.    147.   **
** 2/ 3/79     100   21.4    6.2    12.6     95.    215.    116.    262.     41.    154.   **
** 2/ 3/79     115   21.4    6.0    12.9     60.    210.     72.    252.     26.    148.   **
** 2/ 3/79     130   21.4    6.0    12.9     60.    210.     72.    252.     26.    148.   **
** 2/ 3/79     145   21.4    6.3    12.6     56.    200.     69.    245.     25.    144.   **
** 2/ 3/79     200   21.7    6.5    12.3     55.    195.     68.    242.     24.    142.   **
** 2/ 3/79     215   21.7    7.8    11.5     60.    190.     82.    260.     29.    152.   **
** 2/ 3/79     230   21.7    8.3    10.5     60.    200.     85.    284.     30.    167.   **
** 2/ 3/79     245   21.7    8.0    10.3     60.    192.     83.    266.     30.    156.   **
** 2/ 3/79     300   17.6    6.5    11.8    150.    198.    186.    246.     67.    145.   **
** 2/ 3/79     315   17.6    6.5    12.1    140.    200.    174.    249.     62.    146.   **
** 2/ 3/79     330   17.6    6.5    12.3    200.    190.    249.    236.     89.    139.   **
** 2/ 3/79     345   17.6    6.5    12.3    200.    200.    249.    249.     89.    146.   **
** 2/ 3/79     400   20.5    7.5    11.3     90.    210.    120.    281.     43.    165.   **
** 2/ 3/79     415   20.5    6.0    11.3    120.    210.    144.    252.     52.    148.   **
** 2/ 3/79     430   20.5    6.1    12.6    110.    215.    133.    260.     48.    153.   **
** 2/ 3/79     445   20.5    6.1    12.6    110.    215.    133.    260.     48.    153.   **
** 2/ 3/79     500   22.9    6.2    12.3    100.    211.    122.    257.     44.    151.   **
** 2/ 3/79     515   22.9    6.1    12.3     90.    210.    109.    254.     39.    149.   **
** 2/ 3/79     530   22.9    5.9    12.9     90.    212.    107.    253.     38.    149.   **
** 2/ 3/79     545   22.9    6.5    12.6     85.    200.    106.    249.     38.    146.   **
** 2/ 3/79     600   23.1    7.8    11.3     70.    200.     96.    273.     34.    160.   **
** 2/ 3/79     615   23.1    7.2    11.3     70.    210.     91.    274.     33.    161.   **
** 2/ 3/79     630   23.1    6.5    11.8     80.    200.     99.    249.     36.    146.   **
** 2/ 3/79     645   23.1    6.9    11.5     80.    190.    102.    243.     37.    143.   **
** 2/ 3/79     700   22.9    8.4    10.3     80.    205.    115.    294.     41.    172.   **
** 2/ 3/79     715   22.9    7.5    11.0     90.    205.    120.    274.     43.    161.   **
** 2/ 3/79     730   22.9    7.3    11.3     80.    210.    105.    276.     38.    162.   **
** 2/ 3/79     745   22.9    7.2    11.3     65.    205.     85.    268.     30.    157.   **
** 2/ 3/79     800   20.5    6.0    12.6     65.    212.     78.    255.     28.    150.   **
** 2/ 3/79     815   20.5    8.5    10.0     59.    210.     85.    303.     30.    178.   **
** 2/ 3/79     830   20.5    6.2    12.3     60.    210.     73.    256.     26.    150.   **
** 2/ 3/79     845   20.5    6.5    12.1     62.    212.     77.    264.     28.    155.   **
** 2/ 3/79     900   21.4    6.0    12.3     62.    215.     74.    258.     27.    152.   **
** 2/ 3/79     915   21.4    6.5    12.1     95.    210.    118.    261.     42.    153.   **
** 2/ 3/79     930   21.4    6.3    12.9     60.    190.     74.    233.     26.    137.   **
** 2/ 3/79     945   21.4    7.0    11.5     65.    210.     84.    270.     30.    159.   **
** 2/ 3/79    1000   20.5    8.2    10.3     66.    220.     93.    310.     33.    182.   **
** 2/ 3/79    1015   20.5    6.5    12.1     60.    220.     75.    273.     27.    161.   **
** 2/ 3/79    1030   20.5    6.9    11.8     60.    215.     77.    275.     27.    161.   **
** 2/ 3/79    1045   20.5    7.8    11.3     59.    215.     81.    294.     29.    172.   **
** 2/ 3/79    1100   20.5    7.7    11.0     60.    225.     81.    305.     29.    179.   **
** 2/ 3/79    1115   20.5    7.7    11.0     60.    225.     81.    305.     29.    179.   **
** 2/ 3/79    1130   20.5    7.1    11.3     58.    220.     75.    285.     27.    168.   **
** 2/ 3/79    1145   20.5    7.1    11.3     58.    220.     75.    285.     27.    168.   **
** 2/ 3/79    1200   20.5    7.0    11.3     58.    221.     75.    285.     27.    167.   **
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**                                 15 MIN. DATA                                        **
**                         DRY STACK GAS CONCENTRATION                                 **
**                                                                                     **
**                          O2     CO2     CO      NO      CU      NO      CO     NO   **
**                  LOAD   VOL%    VOL%   PPMV    PPMV    PPMV    PPMV    NG/J   NG/J  **
**   DATE    TIME   MWTH   MEAS    MEAS   MEAS    MEAS    3%U2    3%O2                 **
*****************************************************************************************
** 2/ 3/79   1215   20.5    7.0    11.3    58.    220.     75.    283.     27.   166.  **
** 2/ 3/79   1230   20.5    6.5    11.8    59.    215.     73.    267.     26.   157.  **
** 2/ 3/79   1245   20.5    7.0    11.3    54.    218.     70.    281.     25.   165.  **
** 2/ 3/79   1300   21.1    7.0    11.3    56.    220.     72.    283.     26.   166.  **
** 2/ 3/79   1315   21.1    6.9    11.3    58.    200.     74.    256.     27.   150.  **
** 2/ 3/79   1330   21.1    6.6    11.5    80.    212.    100.    265.     36.   156.  **
** 2/ 3/79   1345   21.1    6.2    11.8    90.    212.    110.    258.     39.   152.  **
** 2/ 3/79   1400   22.9    6.4    11.5    70.    210.     86.    259.     31.   152.  **
** 2/ 3/79   1415   22.9    6.3    12.1    60.    208.     74.    255.     26.   150.  **
** 2/ 3/79   1430   22.9    7.0    11.5    60.    210.     77.    270.     28.   159.  **
** 2/ 3/79   1445   22.9    7.0    11.3    56.    220.     72.    283.     26.   166.  **
** 2/ 3/79   1500   21.4    7.0    11.3    55.    220.     71.    283.     25.   166.  **
** 2/ 3/79   1515   21.4    7.1    11.3    54.    220.     70.    285.     25.   168.  **
** 2/ 3/79   1530   21.4    7.3    11.3    44.    225.     58.    296.     21.   174.  **
** 2/ 3/79   1545   21.4    7.0    11.5    44.    232.     57.    299.     20.   175.  **
** 2/ 3/79   1600   21.1    6.5    12.1    43.    231.     53.    287.     19.   169.  **
** 2/ 3/79   1615   21.1    6.5    12.1    45.    228.     56.    283.     20.   166.  **
** 2/ 3/79   1630   21.1    6.7    11.8    42.    210.     53.    265.     19.   155.  **
** 2/ 3/79   1645   21.1    7.5    11.5    42.    190.     56.    254.     20.   149.  **
** 2/ 3/79   1700   19.9    9.5     9.8    42.    240.     66.    377.     24.   221.  **
** 2/ 3/79   1715   19.9    8.0    10.5    60.    230.     83.    319.     30.   187.  **
** 2/ 3/79   1730   19.9    7.5    11.3    45.    210.     60.    281.     21.   165.  **
** 2/ 3/79   1745   19.9    6.5    12.9   105.    218.    131.    271.     47.   159.  **
** 2/ 3/79   1800   22.3    7.5    11.5    70.    215.     94.    287.     33.   169.  **
** 2/ 3/79   1815   22.3    8.0    11.0    50.    210.     69.    291.     25.   171.  **
** 2/ 3/79   1830   22.3    8.4    10.8    44.    225.     63.    322.     23.   189.  **
** 2/ 3/79   1845   22.3    7.9    11.0    44.    226.     61.    311.     22.   183.  **
** 2/ 3/79   1900   19.9    7.8    11.0    44.    230.     60.    314.     21.   185.  **
** 2/ 3/79   1915   19.9    7.7    11.0    45.    230.     61.    312.     22.   183.  **
** 2/ 3/79   1930   19.9    7.8    11.0    43.    234.     59.    320.     21.   188.  **
** 2/ 3/79   1945   19.9    7.2    11.3    42.    225.     55.    294.     20.   173.  **
** 2/ 3/79   2000   19.9    7.6    11.0    43.    215.     58.    289.     21.   170.  **
** 2/ 3/79   2015   19.9    7.7    11.0    50.    224.     68.    304.     24.   178.  **
** 2/ 3/79   2030   19.9    7.3    11.3    42.    220.     55.    290.     20.   170.  **
** 2/ 3/79   2045   19.9    6.9    11.8    50.    215.     64.    275.     23.   161.  **
** 2/ 3/79   2100   20.5    6.8    11.8    44.    220.     56.    279.     20.   164.  **
** 2/ 3/79   2115   20.5    6.7    12.3    45.    215.     57.    271.     20.   159.  **
** 2/ 3/79   2130   20.5    7.0    11.5    45.    219.     58.    282.     21.   166.  **
** 2/ 3/79   2145   20.5    7.1    11.5    44.    218.     57.    283.     20.   166.  **
** 2/ 3/79   2200   20.5    6.9    11.8    45.    214.     58.    274.     21.   161.  **
** 2/ 3/79   2215   20.5    7.0    11.5    48.    220.     62.    283.     22.   166.  **
** 2/ 3/79   2230   20.5    7.3    11.5    52.    215.     68.    283.     24.   166.  **
** 2/ 3/79   2245   20.5    6.9    11.8    50.    212.     64.    271.     23.   159.  **
** 2/ 3/79   2300   20.5    6.9    11.8    54.    210.     69.    268.     25.   158.  **
** 2/ 3/79   2315   20.5    6.0    12.6    60.    212.     72.    255.     26.   150.  **
** 2/ 3/79   2330   20.5    6.5    12.3    70.    220.     87.    273.     31.   161.  **
** 2/ 3/79   2345   20.5    6.5    12.6   200.    200.    249.    289.     89.   146.  **
** 2/ 3/79   2400   22.9    5.0    13.2   250.    190.    281.    214.    101.   126.  **
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15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
2/ 4/79	15	22.9	5.0	13.2	400.	200.	450.	225.	161.	132.
2/ 4/79	30	22.9	4.5	13.8	300.	212.	327.	231.	117.	136.
2/ 4/79	45	22.9	4.6	13.8	200.	218.	220.	239.	78.	141.
2/ 4/79	100	22.9	4.6	13.8	200.	215.	220.	236.	78.	139.
2/ 4/79	115	22.9	5.5	13.2	75.	215.	87.	250.	31.	147.
2/ 4/79	130	22.9	5.1	13.2	100.	210.	113.	238.	40.	140.
2/ 4/79	145	22.9	5.5	12.6	75.	200.	87.	232.	31.	136.
2/ 4/79	200	22.6	6.0	12.6	65.	200.	78.	240.	28.	141.
2/ 4/79	215	22.6	6.2	12.6	62.	200.	75.	244.	27.	143.
2/ 4/79	230	22.6	6.0	12.9	90.	210.	108.	252.	39.	148.
2/ 4/79	245	22.6	6.0	12.6	75.	195.	90.	234.	32.	138.
2/ 4/79	300	22.6	5.5	13.8	65.	205.	76.	238.	27.	140.
2/ 4/79	315	22.6	6.5	13.2	75.	218.	93.	271.	33.	159.
2/ 4/79	330	22.6	5.1	13.5	80.	210.	91.	238.	32.	140.
2/ 4/79	345	22.6	6.5	12.6	60.	215.	75.	267.	27.	157.
2/ 4/79	400	22.9	6.2	12.6	64.	214.	78.	261.	28.	153.
2/ 4/79	415	22.9	6.2	12.3	56.	220.	68.	268.	24.	157.
2/ 4/79	450	22.9	6.1	12.6	80.	215.	97.	260.	35.	153.
2/ 4/79	445	22.9	6.1	12.6	80.	215.	97.	260.	35.	153.
2/ 4/79	500	22.3	6.8	12.3	90.	212.	114.	269.	41.	158.
2/ 4/79	515	22.3	8.5	10.3	50.	210.	72.	303.	26.	178.
2/ 4/79	530	22.3	4.9	13.8	125.	205.	140.	229.	50.	135.
2/ 4/79	545	22.3	4.8	13.8	110.	209.	122.	232.	44.	136.
2/ 4/79	600	22.9	4.9	13.8	90.	208.	101.	233.	36.	137.
2/ 4/79	615	22.9	7.0	11.5	50.	205.	64.	264.	23.	155.
2/ 4/79	630	22.9	7.1	11.3	50.	200.	65.	259.	23.	152.
2/ 4/79	645	22.9	7.1	11.3	54.	190.	70.	246.	25.	145.
2/ 4/79	700	21.7	7.2	11.3	54.	190.	71.	248.	25.	146.
2/ 4/79	715	21.7	7.3	11.3	60.	185.	79.	243.	28.	143.
2/ 4/79	730	21.7	7.5	11.0	58.	184.	77.	246.	28.	144.
2/ 4/79	745	21.7	7.7	11.0	60.	190.	81.	258.	29.	151.
2/ 4/79	800	20.5	9.0	9.8	50.	175.	75.	263.	27.	155.
2/ 4/79	815	20.5	8.5	10.3	50.	190.	72.	274.	26.	161.
2/ 4/79	830	20.5	7.5	11.3	52.	200.	69.	267.	25.	157.
2/ 4/79	845	20.5	7.0	11.5	65.	200.	84.	258.	30.	151.
2/ 4/79	900	20.5	8.0	11.5	65.	200.	90.	278.	32.	163.
2/ 4/79	915	20.5	7.0	12.1	60.	220.	77.	283.	28.	166.
2/ 4/79	930	20.5	6.5	12.3	85.	218.	106.	271.	38.	159.
2/ 4/79	945	20.5	6.3	12.9	60.	210.	74.	257.	26.	151.
2/ 4/79	1000	21.1	6.3	12.9	60.	210.	74.	257.	26.	151.
2/ 4/79	1015	21.1	6.0	12.9	60.	212.	72.	255.	26.	150.
2/ 4/79	1030	21.1	5.9	13.2	61.	202.	73.	241.	26.	142.
2/ 4/79	1045	21.1	6.5	12.9	58.	208.	72.	259.	26.	152.
2/ 4/79	1100	22.6	6.6	12.9	56.	208.	70.	260.	25.	153.
2/ 4/79	1115	22.6	6.0	12.9	58.	205.	70.	246.	25.	145.
2/ 4/79	1130	22.6	6.0	12.9	60.	200.	72.	240.	26.	141.
2/ 4/79	1145	22.6	7.0	11.8	60.	190.	77.	245.	28.	144.
2/ 4/79	1200	21.1	7.1	11.8	60.	200.	78.	259.	28.	152.

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**                                 15 MIN. DATA                                    **
**                          DRY STACK GAS CONCENTRATION                            **
**                                                                                 **
**                             O2      CO2     CO      NO      CO      NO      CO      NO     **
**                     LOAD   VOL%    VOL%    PPMV    PPMV    PPMV    PPMV    NG/J    NG/J    **
**  DATE      TIME     MWTH   MEAS    MEAS    MEAS    MEAS    3%O2    3%O2                    **
*************************************************************************************
** 2/ 4/79    1215     21.1    7.5    11.5     70.    200.     94.    267.     33.    157.    **
** 2/ 4/79    1230     21.1    6.8    12.1     80.    200.    102.    254.     36.    149.    **
** 2/ 4/79    1245     21.1    6.5    12.6     75.    198.     93.    246.     33.    145.    **
** 2/ 4/79    1300     20.5    6.5    12.6     65.    200.     81.    249.     29.    146.    **
** 2/ 4/79    1315     20.5    6.0    12.9     55.    200.     66.    240.     24.    141.    **
** 2/ 4/79    1330     20.5    6.5    12.3     70.    190.     87.    236.     31.    139.    **
** 2/ 4/79    1345     20.5    7.0    11.3     70.    210.     90.    270.     32.    159.    **
** 2/ 4/79    1400     21.1    8.0    10.8     60.    220.     83.    305.     30.    179.    **
** 2/ 4/79    1415     21.1    7.0    11.3     90.    220.    116.    283.     41.    166.    **
** 2/ 4/79    1430     21.1    5.0    13.8     42.    220.     47.    248.     17.    145.    **
** 2/ 4/79    1445     21.1    5.0    13.5     43.    220.     48.    248.     17.    145.    **
** 2/ 4/79    1500     23.1    7.4    11.3     43.    216.     57.    286.     20.    168.    **
** 2/ 4/79    1515     23.1    6.5    12.3     42.    232.     52.    288.     19.    169.    **
** 2/ 4/79    1530     23.1    8.0    11.3     50.    230.     69.    319.     25.    187.    **
** 2/ 4/79    1545     23.1    6.5    12.6    100.    222.    124.    276.     44.    162.    **
** 2/ 4/79    1600     21.1    5.5    12.9     60.    225.     70.    262.     25.    154.    **
** 2/ 4/79    1615     21.1    6.9    12.3     58.    228.     74.    292.     27.    171.    **
** 2/ 4/79    1630     21.1    6.2    12.3     55.    226.     67.    275.     24.    162.    **
** 2/ 4/79    1645     21.1    6.7    12.1     55.    228.     69.    287.     25.    169.    **
** 2/ 4/79    1700     21.1    6.5    12.3     80.    230.     99.    286.     36.    168.    **
** 2/ 4/79    1715     21.1    6.7    12.1     55.    226.     69.    285.     25.    167.    **
** 2/ 4/79    1730     21.1    6.0    12.6     52.    230.     62.    276.     22.    162.    **
** 2/ 4/79    1745     21.1    6.8    12.1     52.    230.     66.    292.     24.    171.    **
** 2/ 4/79    1800     20.8    7.0    11.5     55.    224.     71.    288.     25.    169.    **
** 2/ 4/79    1815     20.8    7.0    11.5     56.    218.     72.    281.     26.    165.    **
** 2/ 4/79    1830     20.8    6.7    11.8     60.    213.     76.    268.     27.    158.    **
** 2/ 4/79    1845     20.8    6.6    12.1     60.    212.     75.    265.     27.    156.    **
** 2/ 4/79    1900     20.8    6.6    12.1     85.    210.    106.    263.     38.    154.    **
** 2/ 4/79    1915     20.8    6.6    12.1     60.    200.     75.    250.     27.    147.    **
** 2/ 4/79    1930     20.8    6.2    12.6    100.    185.    122.    225.     44.    132.    **
** 2/ 4/79    1945     20.8    6.5    12.3    100.    200.    124.    249.     44.    146.    **
** 2/ 4/79    2000     20.5    6.7    12.1     70.    200.     88.    252.     32.    148.    **
** 2/ 4/79    2015     20.5    6.5    12.3    100.    202.    124.    251.     44.    147.    **
** 2/ 4/79    2030     20.5    6.5    12.3     55.    208.     68.    259.     24.    152.    **
** 2/ 4/79    2045     20.5    6.5    12.6     60.    220.     75.    273.     27.    161.    **
** 2/ 4/79    2100     21.1    6.2    12.6     55.    225.     67.    274.     24.    161.    **
** 2/ 4/79    2115     21.1    6.4    12.3     60.    226.     74.    279.     26.    164.    **
** 2/ 4/79    2130     21.1    6.8    12.1     56.    228.     71.    289.     25.    170.    **
** 2/ 4/79    2145     21.1    6.8    11.8     52.    230.     66.    292.     24.    171.    **
** 2/ 4/79    2200     20.5    7.0    11.8     52.    228.     67.    294.     24.    172.    **
** 2/ 4/79    2215     20.5    6.8    12.1     52.    228.     66.    289.     24.    170.    **
** 2/ 4/79    2230     20.5    6.7    12.1     90.    225.    113.    284.     41.    167.    **
** 2/ 4/79    2245     20.5    6.7    12.3    100.    225.    126.    284.     45.    167.    **
** 2/ 4/79    2300     20.5    6.2    12.9    120.    222.    146.    270.     52.    159.    **
** 2/ 4/79    2315     20.5    6.4    12.6     60.    225.     74.    278.     26.    163.    **
** 2/ 4/79    2330     20.5    6.0    12.9     60.    220.     72.    264.     26.    155.    **
** 2/ 4/79    2345     20.5    6.4    12.6     70.    228.     86.    281.     31.    165.    **
** 2/ 4/79    2400     24.0    6.5    12.6    100.    230.    124.    286.     44.    168.    **
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**                                                                        
**                               15 MIN. DATA                             **
**                        DRY STACK GAS CONCENTRATION                     **
**                                                                        **
**                       O2     CO2    CO     NO     CO     NO     CO     NO    **
**                LOAD   VOL%   VOL%   PPMV   PPMV   PPMV   PPMV   NG/J   NG/J  **
**  DATE    TIME  MWTH   MEAS   MEAS   MEAS   MEAS   3%O2   3%O2                **
*****************************************************************************
** 2/ 5/79    15  24.0   6.4   12.9    50.   222.    62.   274.    22.   161.   **
** 2/ 5/79    30  24.0   6.0   12.9    60.   226.    72.   272.    26.   159.   **
** 2/ 5/79    45  24.0   6.5   12.1    54.   225.    67.   280.    24.   164.   **
** 2/ 5/79   100  22.0   6.7   12.1    53.   225.    67.   284.    24.   167.   **
** 2/ 5/79   115  22.0   6.8   11.8    52.   220.    66.   279.    24.   164.   **
** 2/ 5/79   130  22.0   7.0   11.8    52.   210.    67.   270.    24.   159.   **
** 2/ 5/79   145  22.0   6.9   12.1    52.   210.    66.   268.    24.   158.   **
** 2/ 5/79   200  20.5   7.0   11.5    52.   214.    67.   276.    24.   162.   **
** 2/ 5/79   215  20.5   7.5   11.3    52.   212.    69.   283.    25.   166.   **
** 2/ 5/79   230  20.5   7.7   10.8   130.   215.   176.   292.    63.   171.   **
** 2/ 5/79   245  20.5   7.3   11.3    88.   205.   116.   270.    41.   158.   **
** 2/ 5/79   300  20.5   5.5   10.8    90.   210.   105.   244.    37.   143.   **
** 2/ 5/79   315  20.5   6.7   12.3   200.   210.   252.   265.    90.   155.   **
** 2/ 5/79   330  20.5   6.7   12.6   100.   200.   126.   252.    45.   148.   **
** 2/ 5/79   345  20.5   6.3   12.6   100.   200.   123.   245.    44.   144.   **
** 2/ 5/79   400  22.0   5.9   13.5   500.   220.   597.   263.   213.   154.   **
** 2/ 5/79   415  22.0   5.6   13.8   300.   220.   351.   257.   125.   151.   **
** 2/ 5/79   430  22.0   5.3   13.8   200.   190.   229.   218.    82.   128.   **
** 2/ 5/79   445  22.0   5.6   12.6   100.   220.   117.   257.    42.   151.   **
** 2/ 5/79   500  20.5   6.5   12.1    60.   220.    75.   273.    27.   161.   **
** 2/ 5/79   515  20.5   7.3   11.3    54.   195.    71.   257.    25.   151.   **
** 2/ 5/79   530  20.5   8.8   10.3    52.   210.    77.   311.    27.   182.   **
** 2/ 5/79   545  20.5   8.4   10.8    53.   220.    76.   315.    27.   185.   **
** 2/ 5/79   600  19.0   7.5   11.3    53.   220.    71.   294.    25.   173.   **
** 2/ 5/79   615  19.0   7.5   11.8   100.   220.   134.   294.    48.   173.   **
** 2/ 5/79   630  19.0   7.0   12.1    60.   218.    77.   281.    28.   165.   **
** 2/ 5/79   645  19.0   6.9   13.2    50.   210.    64.   268.    23.   158.   **
** 2/ 5/79   700  23.4   5.8   13.5    90.   210.   107.   249.    38.   146.   **
** 2/ 5/79   715  23.4   7.0   12.3    60.   215.    77.   277.    28.   163.   **
** 2/ 5/79   730  23.4   6.0   12.9    60.   210.    72.   252.    26.   148.   **
** 2/ 5/79   745  23.4   6.2   12.9    55.   208.    67.   253.    24.   149.   **
** 2/ 5/79   800  23.4   5.7   13.2    75.   204.    88.   240.    32.   141.   **
** 2/ 5/79   815  23.4   5.9   13.2    75.   208.    89.   248.    32.   146.   **
** 2/ 5/79   830  23.4   7.2   11.3    70.   200.    91.   261.    33.   153.   **
** 2/ 5/79   845  23.4   6.5   12.6    80.   216.    99.   268.    36.   158.   **
** 2/ 5/79   900  24.9   6.0   13.2    60.   212.    72.   255.    26.   150.   **
** 2/ 5/79   915  24.9   5.3   13.8   120.   210.   138.   241.    49.   141.   **
** 2/ 5/79   930  24.9   6.0   13.5   100.   215.   120.   258.    43.   152.   **
** 2/ 5/79   945  24.9   6.0   13.5   100.   214.   120.   257.    43.   151.   **
** 2/ 5/79  1000  24.9   6.0   13.2   200.   200.   240.   240.    86.   141.   **
** 2/ 5/79  1015  24.9   7.0   12.3    90.   210.   116.   270.    41.   159.   **
** 2/ 5/79  1030  24.9   6.0   12.6    70.   220.    84.   264.    30.   155.   **
** 2/ 5/79  1045  24.9   6.7   12.3    65.   245.    82.   309.    29.   181.   **
** 2/ 5/79  1100  20.5   7.0   12.1    70.   262.    90.   337.    32.   198.   **
** 2/ 5/79  1115  20.5   6.3   13.2   100.   258.   123.   316.    44.   186.   **
** 2/ 5/79  1130  20.5   6.5   13.2   100.   240.   124.   295.    44.   175.   **
** 2/ 5/79  1145  20.5   6.2   13.5   100.   230.   122.   280.    44.   164.   **
** 2/ 5/79  1200  24.9   5.9   13.2    60.   220.    72.   263.    26.   154.   **
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**                                        15 MIN. DATA                                            **
**                               DRY STACK GAS CONCENTRATION                                      **
**                                                                                                **
**                             O2      CO2     CO      NO      CO      NO      CO      NO         **
**                     LOAD    VOL%    VOL%    PPMV    PPMV    PPMV    PPMV    NG/J    NG/J       **
**    DATE      TIME   MWTH    MEAS    MEAS    MEAS    MEAS    3%O2    3%O2                       **
****************************************************************************************************
** 2/ 5/79      1215   24.9     6.0    12.6    100.    224.    120.    269.     43.    158.       **
** 2/ 5/79      1230   24.9     6.4    12.6    100.    220.    123.    272.     44.    159.       **
** 2/ 5/79      1245   24.9     6.0    13.8     80.    210.     96.    252.     34.    148.       **
** 2/ 5/79      1300   25.5    -1.0      .0     -1.     -1.     -1.     -1.     -1.     -1.       **
** 2/ 5/79      1315   25.5    -1.0      .0     -1.     -1.     -1.     -1.     -1.     -1.       **
** 2/ 5/79      1330   25.5    -1.0      .0     -1.     -1.     -1.     -1.     -1.     -1.       **
** 2/ 5/79      1345   25.5    -1.0      .0     -1.     -1.     -1.     -1.     -1.     -1.       **
** 2/ 5/79      1400   23.4     7.0    12.1     43.    220.     55.    283.     20.    166.       **
** 2/ 5/79      1415   23.4     7.2    11.8     43.    220.     56.    287.     20.    169.       **
** 2/ 5/79      1430   23.4     7.0    11.5     45.    210.     58.    270.     21.    159.       **
** 2/ 5/79      1445   23.4     8.3    10.8     42.    238.     60.    338.     21.    199.       **
** 2/ 5/79      1500   21.1     8.0    11.0     42.    235.     58.    326.     21.    191.       **
** 2/ 5/79      1515   21.1     6.3    12.9     38.    220.     47.    270.     17.    158.       **
** 2/ 5/79      1530   21.1     7.0    11.3     50.    235.     64.    303.     23.    178.       **
** 2/ 5/79      1545   21.1     6.5    12.6     90.    238.    112.    296.     40.    174.       **
** 2/ 5/79      1600   22.0     6.0    12.9    120.    228.    144.    274.     52.    161.       **
** 2/ 5/79      1615   22.0     4.5    14.1    100.    220.    109.    240.     39.    141.       **
** 2/ 5/79      1630   22.0     4.5    14.1     60.    200.     65.    218.     23.    128.       **
** 2/ 5/79      1645   22.0    10.0     9.3     32.    235.     53.    386.     19.    227.       **
** 2/ 5/79      1700   19.0     8.4    10.5     40.    225.     57.    322.     20.    189.       **
** 2/ 5/79      1715   19.0     8.0    10.8     60.    222.     83.    308.     30.    181.       **
** 2/ 5/79      1730   19.0     6.3    12.9    100.    215.    123.    264.     44.    155.       **
** 2/ 5/79      1745   19.0     6.0    12.9     90.    215.    108.    258.     39.    152.       **
** 2/ 5/79      1800   22.0     7.5    11.5     34.    225.     45.    301.     16.    176.       **
** 2/ 5/79      1815   22.0     7.5    11.5     50.    222.     67.    297.     24.    174.       **
** 2/ 5/79      1830   22.0     7.5    11.5     38.    232.     51.    310.     18.    182.       **
** 2/ 5/79      1845   22.0     7.8    11.3     34.    242.     46.    331.     17.    194.       **
** 2/ 5/79      1900   19.9     8.0    11.0     40.    243.     56.    337.     20.    198.       **
** 2/ 5/79      1915   19.9     6.5    13.2     36.    240.     45.    298.     16.    175.       **
** 2/ 5/79      1930   19.9     6.0    13.5     35.    230.     42.    276.     15.    162.       **
** 2/ 5/79      1945   19.9     6.7    12.9     35.    240.     44.    303.     16.    178.       **
** 2/ 5/79      2000   22.0     7.0    11.5     50.    200.     64.    258.     23.    151.       **
** 2/ 5/79      2015   22.0     7.5    11.5     38.    245.     51.    327.     18.    192.       **
** 2/ 5/79      2030   22.0     7.8    11.8     50.    235.     66.    312.     24.    183.       **
** 2/ 5/79      2045   22.0     6.0    12.6     42.    225.     50.    270.     18.    159.       **
** 2/ 5/79      2100   22.9     6.4    12.9     46.    222.     57.    274.     20.    161.       **
** 2/ 5/79      2115   22.9     6.5    12.9     37.    210.     46.    261.     16.    153.       **
** 2/ 5/79      2130   22.9     7.0    12.1     38.    229.     49.    295.     17.    173.       **
** 2/ 5/79      2145   22.9     6.4    12.6     34.    225.     42.    278.     15.    163.       **
** 2/ 5/79      2200   22.0     6.0    12.9     35.    238.     42.    286.     15.    168.       **
** 2/ 5/79      2215   22.0     6.9    12.1     40.    230.     51.    294.     18.    173.       **
** 2/ 5/79      2230   22.0     7.0    11.8     60.    222.     77.    286.     28.    168.       **
** 2/ 5/79      2245   22.0     7.5    11.3     50.    240.     67.    321.     24.    188.       **
** 2/ 5/79      2300   22.0     6.0    13.2     50.    260.     60.    312.     21.    183.       **
** 2/ 5/79      2315   22.0     6.0    12.9     40.    253.     48.    304.     17.    178.       **
** 2/ 5/79      2330   22.0     6.2    12.6     50.    240.     61.    292.     22.    172.       **
** 2/ 5/79      2345   22.0     4.0    14.4    500.    230.    530.    244.    189.    143.       **
** 2/ 5/79      2400   22.9     4.1    14.1    500.    210.    533.    224.    190.    131.       **
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15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
2/ 6/79	15	22.9	4.5	13.8	300.	208.	327.	227.	117.	133.
2/ 6/79	30	22.9	4.9	13.5	175.	202.	196.	226.	70.	133.
2/ 6/79	45	22.9	5.2	12.9	100.	200.	114.	228.	41.	134.
2/ 6/79	100	20.5	6.0	12.6	160.	210.	192.	252.	69.	148.
2/ 6/79	115	20.5	7.0	11.8	200.	218.	258.	281.	92.	165.
2/ 6/79	130	20.5	6.5	12.1	150.	220.	186.	273.	67.	161.
2/ 6/79	145	20.5	6.5	12.1	150.	228.	186.	283.	67.	166.
2/ 6/79	200	20.5	6.5	12.1	200.	229.	249.	285.	89.	167.
2/ 6/79	215	20.5	6.7	12.1	225.	230.	284.	290.	101.	170.
2/ 6/79	230	20.5	6.4	12.3	150.	230.	185.	284.	66.	167.
2/ 6/79	245	20.5	6.7	12.1	50.	230.	63.	290.	23.	170.
2/ 6/79	300	20.5	7.0	11.5	100.	230.	129.	296.	46.	178.
2/ 6/79	315	20.5	8.5	10.5	100.	235.	144.	339.	52.	199.
2/ 6/79	330	20.5	6.5	12.3	150.	236.	186.	293.	67.	172.
2/ 6/79	345	20.5	6.0	12.9	100.	232.	120.	279.	43.	164.
2/ 6/79	400	21.4	5.2	13.2	125.	222.	143.	253.	51.	149.
2/ 6/79	415	21.4	7.0	11.8	125.	225.	161.	290.	58.	170.
2/ 6/79	430	21.4	6.2	12.9	80.	228.	97.	278.	35.	163.
2/ 6/79	445	21.4	6.5	12.6	150.	225.	186.	280.	67.	164.
2/ 6/79	500	21.7	6.0	12.9	170.	227.	204.	273.	73.	160.
2/ 6/79	515	21.7	6.0	12.9	150.	221.	180.	265.	64.	156.
2/ 6/79	530	21.7	7.0	11.8	40.	228.	52.	294.	18.	172.
2/ 6/79	545	21.7	9.5	9.6	38.	230.	60.	361.	21.	212.
2/ 6/79	600	20.5	8.5	10.0	50.	230.	72.	332.	26.	195.
2/ 6/79	615	20.5	4.9	14.4	200.	215.	224.	241.	80.	141.
2/ 6/79	630	20.5	6.3	12.6	100.	230.	123.	282.	44.	166.
2/ 6/79	645	20.5	6.3	12.3	40.	220.	49.	270.	18.	158.
2/ 6/79	700	22.9	6.3	12.3	60.	224.	74.	275.	26.	161.
2/ 6/79	715	22.9	6.3	12.3	40.	225.	49.	276.	18.	162.
2/ 6/79	730	22.9	6.5	12.3	42.	215.	52.	267.	19.	157.
2/ 6/79	745	22.9	7.3	11.5	40.	210.	53.	276.	19.	162.
2/ 6/79	800	21.7	8.0	11.0	42.	220.	58.	305.	21.	179.
2/ 6/79	815	21.7	7.5	11.3	44.	232.	59.	310.	21.	182.
2/ 6/79	830	21.7	6.9	11.8	45.	238.	58.	304.	21.	179.
2/ 6/79	845	21.7	6.4	12.3	42.	242.	52.	299.	19.	175.
2/ 6/79	900	20.8	6.5	12.3	42.	240.	52.	298.	19.	175.
2/ 6/79	915	20.8	6.3	12.6	44.	242.	54.	297.	19.	178.
2/ 6/79	930	20.8	6.3	12.6	42.	228.	51.	280.	18.	164.
2/ 6/79	945	20.8	6.9	12.1	42.	242.	54.	309.	19.	182.
2/ 6/79	1000	21.4	6.5	12.1	46.	235.	57.	292.	20.	172.
2/ 6/79	1015	21.4	6.5	12.1	40.	232.	50.	288.	18.	169.
2/ 6/79	1030	21.4	7.0	11.5	32.	226.	41.	291.	15.	171.
2/ 6/79	1045	21.4	6.4	12.3	40.	215.	49.	265.	18.	156.
2/ 6/79	1100	21.1	6.5	12.3	40.	215.	50.	267.	18.	157.
2/ 6/79	1115	21.1	7.5	11.3	50.	218.	67.	291.	24.	171.
2/ 6/79	1130	21.1	7.0	11.5	30.	212.	39.	273.	14.	160.
2/ 6/79	1145	21.1	7.5	11.3	30.	215.	40.	287.	14.	169.
2/ 6/79	1200	19.9	7.7	11.0	30.	215.	41.	292.	15.	171.

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**                                        15 MIN. DATA                                      **
**                              DRY STACK GAS CONCENTRATION                                 **
**                                                                                          **
**                                 O2     CO2     CO      NO      CO      NO      CO     NO **
**                        LOAD    VOL%    VOL%    PPMV    PPMV    PPMV    PPMV    NG/J   NG/J **
**    DATE        TIME    MWTH    MEAS    MEAS    MEAS    MEAS    3%O2    3%O2              **
**********************************************************************************************
** 2/ 6/79        1215    19.9    7.7     11.0     30.    215.     41.    292.    15.   171.  **
** 2/ 6/79        1230    19.9    7.5     11.3     38.    210.     51.    281.    18.   165.  **
** 2/ 6/79        1245    19.9    7.5     11.3     40.    205.     53.    274.    19.   161.  **
** 2/ 6/79        1300    19.6    7.0     11.5     40.    208.     52.    268.    18.   157.  **
** 2/ 6/79        1315    19.6    5.3     13.2     50.    212.     57.    243.    21.   143.  **
** 2/ 6/79        1330    19.6    6.7     12.6     60.    222.     76.    280.    27.   164.  **
** 2/ 6/79        1345    19.6    6.5     12.6     55.    225.     68.    280.    24.   164.  **
** 2/ 6/79        1400    20.5    6.7     12.1     45.    235.     57.    296.    20.   174.  **
** 2/ 6/79        1415    20.5    6.8     12.1     34.    233.     43.    296.    15.   174.  **
** 2/ 6/79        1430    20.5    7.3     11.5     34.    230.     45.    303.    16.   178.  **
** 2/ 6/79        1445    20.5    7.0     11.5     35.    226.     45.    291.    16.   171.  **
** 2/ 6/79        1500    20.5    6.5     12.1     40.    222.     50.    276.    18.   162.  **
** 2/ 6/79        1515    20.5    6.3     12.3     40.    221.     49.    271.    18.   159.  **
** 2/ 6/79        1530    20.5    6.5     12.3     35.    218.     44.    271.    16.   159.  **
** 2/ 6/79        1545    20.5    7.2     11.5     33.    212.     43.    277.    15.   163.  **
** 2/ 6/79        1600    20.5    6.9     12.1     34.    208.     43.    266.    16.   156.  **
** 2/ 6/79        1615    20.5    7.5     11.3     40.    200.     53.    267.    19.   157.  **
** 2/ 6/79        1630    20.5    7.3     11.5     42.    210.     55.    276.    20.   162.  **
** 2/ 6/79        1645    20.5    6.8     11.8     35.    210.     44.    267.    16.   157.  **
** 2/ 6/79        1700    20.5    6.7     11.8     39.    210.     49.    265.    18.   155.  **
** 2/ 6/79        1715    20.5    6.0     12.6     50.    212.     60.    255.    21.   150.  **
** 2/ 6/79        1730    20.5    5.5     13.2     40.    210.     46.    244.    17.   143.  **
** 2/ 6/79        1745    20.5    5.5     13.2     45.    210.     52.    244.    19.   143.  **
** 2/ 6/79        1800    22.3    5.8     12.9     39.    212.     46.    251.    17.   148.  **
** 2/ 6/79        1815    22.3    6.3     12.6     39.    218.     48.    267.    17.   157.  **
** 2/ 6/79        1830    22.3    6.4     12.6     38.    219.     47.    270.    17.   159.  **
** 2/ 6/79        1845    22.3    6.0     12.6     36.    210.     43.    252.    15.   148.  **
** 2/ 6/79        1900    21.4    6.5     12.3     42.    220.     52.    273.    19.   161.  **
** 2/ 6/79        1915    21.4    8.9     10.0     42.    221.     63.    330.    22.   194.  **
** 2/ 6/79        1930    21.4    5.9     12.9     60.    220.     72.    263.    26.   154.  **
** 2/ 6/79        1945    21.4    5.3     13.2     60.    205.     69.    235.    25.   138.  **
** 2/ 6/79        2000    22.0    9.6      9.6     38.    235.     60.    372.    22.   219.  **
** 2/ 6/79        2015    22.0    7.3     11.3     39.    225.     51.    296.    18.   174.  **
** 2/ 6/79        2030    22.0    6.0     12.6    300.    210.    360.    252.   129.   148.  **
** 2/ 6/79        2045    22.0    4.5     13.8    400.    215.    437.    235.   156.   138.  **
** 2/ 6/79        2100    23.1    6.3     13.2    100.    215.    123.    264.    44.   155.  **
** 2/ 6/79        2115    23.1    7.0     11.8     50.    210.     64.    270.    23.   159.  **
** 2/ 6/79        2130    23.1    7.6     11.5     50.    205.     67.    276.    24.   162.  **
** 2/ 6/79        2145    23.1    7.0     11.8     35.    212.     45.    273.    16.   160.  **
** 2/ 6/79        2200    22.0    8.0     11.0     34.    205.     47.    284.    17.   167.  **
** 2/ 6/79        2215    22.0    8.0     11.0     34.    210.     47.    291.    17.   171.  **
** 2/ 6/79        2230    22.0    7.5     11.3     33.    212.     44.    283.    16.   166.  **
** 2/ 6/79        2245    22.0    7.3     11.5     36.    218.     47.    287.    17.   168.  **
** 2/ 6/79        2300    20.5    7.0     11.8     43.    222.     55.    286.    20.   168.  **
** 2/ 6/79        2315    20.5    7.7     11.3     38.    226.     52.    306.    18.   180.  **
** 2/ 6/79        2330    20.5    7.6     11.3     39.    226.     52.    304.    19.   179.  **
** 2/ 6/79        2345    20.5    7.7     11.3     39.    218.     53.    296.    19.   174.  **
** 2/ 6/79        2400    20.5    8.5     10.8     39.    220.     56.    318.    20.   186.  **
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15 MIN, DATA

DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
2/ 7/79	15	20.5	7.5	11.3	40.	226.	53.	302.	19.	177.
2/ 7/79	30	20.5	6.5	12.3	40.	228.	50.	283.	18.	166.
2/ 7/79	45	20.5	6.9	12.1	40.	223.	51.	285.	18.	167.
2/ 7/79	100	21.4	6.5	12.6	34.	221.	42.	275.	15.	161.
2/ 7/79	115	21.4	6.5	12.3	38.	220.	47.	273.	17.	161.
2/ 7/79	130	21.4	6.8	12.1	42.	210.	53.	267.	19.	157.
2/ 7/79	145	21.4	6.5	12.3	45.	210.	56.	281.	20.	153.
2/ 7/79	200	22.0	6.5	12.3	60.	208.	75.	259.	27.	152.
2/ 7/79	215	22.0	6.4	12.3	60.	205.	74.	253.	26.	149.
2/ 7/79	230	22.0	6.0	12.6	65.	220.	78.	264.	28.	155.
2/ 7/79	245	22.0	6.3	12.6	42.	215.	51.	264.	18.	155.
2/ 7/79	300	20.5	7.3	11.8	50.	221.	66.	291.	24.	171.
2/ 7/79	315	20.5	7.5	11.5	43.	222.	57.	297.	21.	174.
2/ 7/79	330	20.5	7.5	11.5	45.	220.	60.	294.	21.	173.
2/ 7/79	345	20.5	7.3	11.8	43.	212.	57.	279.	20.	164.
2/ 7/79	400	19.9	7.0	11.8	43.	210.	55.	270.	20.	159.
2/ 7/79	415	19.9	6.5	12.3	50.	210.	62.	261.	22.	153.
2/ 7/79	430	19.9	7.5	11.5	43.	230.	57.	307.	21.	180.
2/ 7/79	445	19.9	8.0	11.3	36.	229.	50.	318.	18.	187.
2/ 7/79	500	19.9	8.5	11.0	39.	230.	56.	332.	20.	195.
2/ 7/79	515	19.9	8.6	10.8	37.	230.	54.	335.	19.	197.
2/ 7/79	530	19.9	8.0	11.0	38.	229.	53.	318.	19.	187.
2/ 7/79	545	19.9	8.0	11.0	38.	230.	53.	319.	19.	187.
2/ 7/79	600	20.2	7.5	11.3	38.	231.	51.	309.	18.	181.
2/ 7/79	615	20.2	7.4	11.5	38.	240.	50.	318.	18.	187.
2/ 7/79	630	20.2	7.8	11.0	39.	241.	53.	329.	19.	193.
2/ 7/79	645	20.2	8.0	11.3	39.	235.	54.	326.	19.	191.
2/ 7/79	700	20.5	7.9	11.5	39.	240.	54.	330.	19.	194.
2/ 7/79	715	20.5	7.2	11.5	39.	235.	51.	307.	18.	180.
2/ 7/79	730	20.5	7.6	11.5	36.	235.	48.	316.	17.	186.
2/ 7/79	745	20.5	7.5	11.3	35.	230.	47.	307.	17.	180.
2/ 7/79	800	20.5	7.7	11.0	38.	226.	52.	306.	18.	180.
2/ 7/79	815	20.5	8.4	11.3	39.	225.	56.	322.	20.	189.
2/ 7/79	830	20.5	7.4	11.0	38.	228.	50.	302.	18.	177.
2/ 7/79	845	20.5	7.4	11.5	38.	230.	50.	305.	18.	179.
2/ 7/79	900	22.0	7.4	11.8	40.	238.	53.	316.	19.	185.
2/ 7/79	915	22.0	7.0	11.8	50.	231.	64.	297.	23.	175.
2/ 7/79	930	22.0	7.0	11.8	42.	220.	54.	283.	19.	166.
2/ 7/79	945	22.0	7.5	11.5	50.	232.	67.	310.	24.	182.
2/ 7/79	1000	22.0	7.0	11.8	50.	220.	64.	283.	23.	166.
2/ 7/79	1015	22.0	7.6	11.5	48.	240.	65.	323.	23.	190.
2/ 7/79	1030	22.0	7.9	10.8	48.	215.	66.	296.	24.	178.
2/ 7/79	1045	22.0	7.5	11.5	50.	225.	67.	301.	24.	176.
2/ 7/79	1100	22.0	8.0	11.0	50.	222.	69.	308.	25.	181.
2/ 7/79	1115	22.0	8.0	11.0	49.	230.	68.	319.	24.	187.
2/ 7/79	1130	22.0	8.0	11.3	44.	218.	61.	302.	22.	178.
2/ 7/79	1145	22.0	7.0	12.1	44.	215.	57.	277.	20.	163.
2/ 7/79	1200	21.1	8.1	10.8	60.	212.	84.	296.	30.	174.

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**                                  15 MIN. DATA                                         **
**                          DRY STACK GAS CONCENTRATION                                  **
**                                                                                       **
**                               O2     CO2     CO      NO      CO      NO      CO     NO  **
**                      LOAD    VOL%    VOL%   PPMV    PPMV    PPMV    PPMV    NG/J   NG/J **
**     DATE     TIME    MWTH    MEAS    MEAS   MEAS    MEAS    3%O2    3%O2              **
*******************************************************************************************
** 2/ 7/79      1215    21.1     7.5    11.3    45.    218.     60.    291.     21.   171.  **
** 2/ 7/79      1230    21.1     8.0    11.0    42.    216.     58.    300.     21.   176.  **
** 2/ 7/79      1245    21.1     8.0    11.0    43.    218.     60.    302.     21.   178.  **
** 2/ 7/79      1300    21.7     7.6    11.3    44.    218.     59.    293.     21.   172.  **
** 2/ 7/79      1315    21.7     7.5     9.3    42.    216.     56.    289.     20.   169.  **
** 2/ 7/79      1330    21.7     7.4    11.5    50.    220.     66.    292.     24.   171.  **
** 2/ 7/79      1345    21.7     6.3    12.3    42.    212.     51.    260.     18.   153.  **
** 2/ 7/79      1400    20.5     6.9    12.6    42.    175.     54.    224.     19.   131.  **
** 2/ 7/79      1415    20.5     7.4    11.8    56.    195.     74.    259.     27.   152.  **
** 2/ 7/79      1430    20.5     6.5    12.3    45.    194.     56.    241.     20.   142.  **
** 2/ 7/79      1445    20.5     7.0    12.3    42.    202.     54.    260.     19.   153.  **
** 2/ 7/79      1500    20.5     6.5    12.6    50.    208.     62.    259.     22.   152.  **
** 2/ 7/79      1515    20.5     6.3    12.6    42.    208.     51.    255.     18.   150.  **
** 2/ 7/79      1530    20.5     7.1    11.8    39.    208.     51.    270.     18.   158.  **
** 2/ 7/79      1545    20.5     7.2    11.8    36.    210.     47.    274.     17.   161.  **
** 2/ 7/79      1600    20.2     7.5    11.5    35.    215.     47.    287.     17.   169.  **
** 2/ 7/79      1615    20.2     7.5    11.5    35.    222.     47.    297.     17.   174.  **
** 2/ 7/79      1630    20.2     6.5    12.3    60.    216.     75.    268.     27.   158.  **
** 2/ 7/79      1645    20.2     5.1    13.5    80.    205.     91.    232.     32.   136.  **
** 2/ 7/79      1700    20.2     5.9    12.9    70.    220.     84.    263.     30.   154.  **
** 2/ 7/79      1715    20.2     5.9    12.9    60.    222.     72.    265.     26.   156.  **
** 2/ 7/79      1730    20.2     6.1    12.6    50.    220.     60.    266.     22.   156.  **
** 2/ 7/79      1745    20.2     6.9    12.3    34.    218.     43.    279.     16.   164.  **
** 2/ 7/79      1800    19.9     6.9    12.1    36.    218.     46.    279.     16.   164.  **
** 2/ 7/79      1815    19.9     6.9    12.1    35.    217.     45.    277.     16.   163.  **
** 2/ 7/79      1830    19.9     6.9    12.1    35.    218.     45.    279.     16.   164.  **
** 2/ 7/79      1845      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
** 0/ 0/79         0      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
** 0/ 0/79         0      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
** 0/ 0/79         0      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
** 0/ 0/79         0      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
** 0/ 0/79         0      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
** 0/ 0/79         0      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
** 0/ 0/79         0      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
** 0/ 0/79         0      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
** 0/ 0/79         0      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
** 0/ 0/79         0      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
** 0/ 0/79         0      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
** 0/ 0/79         0      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
** 0/ 0/79         0      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
** 0/ 0/79         0      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
** 0/ 0/79         0      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
** 0/ 0/79         0      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
** 0/ 0/79         0      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
** 0/ 0/79         0      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
** 0/ 0/79         0      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
** 0/ 0/79         0      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
** 0/ 0/79         0      .0      .0      .0     0.      0.      0.      0.      0.     0.  **
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**                                                                                              **
**                                      15 MIN. DATA                                            **
**                              DRY STACK GAS CONCENTRATION                                     **
**                                                                                              **
**                             O2      CO2     CO      NO      CO      NO      CO      NO       **
**                    LOAD    VOL%    VOL%    PPMV    PPMV    PPMV    PPMV    NG/J    NG/J      **
**   DATE     TIME    MWTH    MEAS    MEAS    MEAS    MEAS    3%O2    3%O2                      **
**************************************************************************************************
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 0/ 0/79       0      .0      .0      .0      0.      0.      0.      0.      0.      0.      **
** 2/12/79     800    20.5     7.9    11.3     40.    224.     55.    308.     20.    181.      **
** 2/12/79     815    20.5     7.8    11.3     42.    218.     57.    298.     21.    175.      **
** 2/12/79     830    20.5     7.5    11.5     38.    220.     51.    294.     18.    173.      **
** 2/12/79     845    20.5     7.8    11.3     33.    220.     45.    301.     16.    176.      **
** 2/12/79     900    20.5     7.8    11.3     32.    218.     44.    298.     16.    175.      **
** 2/12/79     915    20.5     8.0    11.0     30.    212.     42.    294.     15.    173.      **
** 2/12/79     930    20.5     8.4    10.8     36.    205.     52.    294.     18.    172.      **
** 2/12/79     945    20.5     8.6    10.5     35.    210.     51.    306.     18.    179.      **
** 2/12/79    1000    19.0     8.6    10.5     32.    200.     47.    291.     17.    171.      **
** 2/12/79    1015    19.0    10.0     8.7     40.    190.     66.    312.     23.    183.      **
** 2/12/79    1030    19.0    10.2     8.7     32.    200.     54.    335.     19.    196.      **
** 2/12/79    1045    19.0     9.9     9.1     30.    220.     49.    358.     17.    210.      **
** 2/12/79    1100    20.5     7.5    11.3     32.    218.     43.    291.     15.    171.      **
** 2/12/79    1115    20.5     7.5    11.5     32.    220.     43.    294.     15.    173.      **
** 2/12/79    1130    20.5     7.4    11.5     31.    216.     41.    286.     15.    168.      **
** 2/12/79    1145    20.5     7.6    11.3     32.    220.     43.    296.     15.    174.      **
** 2/12/79    1200    20.5     7.5    11.3     32.    230.     43.    307.     15.    180.      **
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**                                        15 MIN. DATA                                         **
**                                DRY STACK GAS CONCENTRATION                                  **
**                                                                                             **
**                                  O2      CO2     CO      NO      CO      NO      CO     NO  **
**                         LOAD    VOL%    VOL%    PPMV    PPMV    PPMV    PPMV    NG/J   NG/J **
**    DATE        TIME     MWTH    MEAS    MEAS    MEAS    MEAS    3%O2    3%O2               **
*************************************************************************************************
** 2/12/79        1215     20.5     7.4    11.5     33.    226.     44.    300.    16.   176.  **
** 2/12/79        1230     20.5     7.6    11.3     32.    224.     43.    301.    15.   177.  **
** 2/12/79        1245     20.5     8.3    10.8     32.    234.     45.    332.    16.   195.  **
** 2/12/79        1300     20.5    -1.0      .0     -1.     -1.     -1.     -1.    -1.    -1.  **
** 2/12/79        1315     20.5     8.0    11.0     35.    250.     49.    347.    17.   204.  **
** 2/12/79        1330     20.5     8.5    10.5     34.    250.     49.    361.    18.   212.  **
** 2/12/79        1345     20.5     7.9    11.0     32.    246.     44.    339.    16.   199.  **
** 2/12/79        1400     20.5     7.8    11.0     34.    238.     46.    325.    17.   191.  **
** 2/12/79        1415     20.5     7.7    11.3     34.    232.     46.    315.    16.   185.  **
** 2/12/79        1430     20.5     8.0    10.8     38.    225.     53.    312.    19.   183.  **
** 2/12/79        1445     20.5     8.0    10.8     38.    229.     53.    318.    19.   187.  **
** 2/12/79        1500     20.5     8.1    10.8     35.    231.     49.    323.    17.   190.  **
** 2/12/79        1515     20.5     8.1    10.5     36.    233.     50.    326.    18.   191.  **
** 2/12/79        1530     20.5     7.9    11.0     41.    241.     56.    332.    20.   195.  **
** 2/12/79        1545     20.5     7.5    11.3     40.    242.     53.    323.    19.   190.  **
** 2/12/79        1600     20.5     7.8    11.0     42.    242.     57.    331.    21.   194.  **
** 2/12/79        1615     20.5     7.6    11.3     38.    242.     51.    326.    18.   191.  **
** 2/12/79        1630     20.5     7.8    11.0     35.    245.     48.    335.    17.   197.  **
** 2/12/79        1645     20.5     7.5    11.3     34.    250.     45.    334.    16.   196.  **
** 2/12/79        1700     20.5     7.4    11.5     36.    241.     48.    320.    17.   188.  **
** 2/12/79        1715     20.5     7.6    11.3     38.    240.     51.    323.    18.   190.  **
** 2/12/79        1730     20.5     7.5    11.3     39.    229.     52.    306.    19.   180.  **
** 2/12/79        1745     20.5     7.6    11.0     40.    230.     54.    310.    19.   182.  **
** 2/12/79        1800     20.5     7.5    11.3     40.    226.     53.    302.    19.   177.  **
** 2/12/79        1815     20.5     7.3    11.5     38.    222.     50.    292.    18.   172.  **
** 2/12/79        1830     20.5     7.5    11.3     37.    220.     49.    294.    18.   173.  **
** 2/12/79        1845     20.5     7.5    11.3     38.    220.     51.    294.    18.   173.  **
** 2/12/79        1900     20.8     7.3    11.5     34.    232.     45.    305.    16.   179.  **
** 2/12/79        1915     20.8     7.2    11.5     34.    238.     44.    311.    16.   183.  **
** 2/12/79        1930     20.8     7.3    11.5     34.    240.     45.    316.    16.   185.  **
** 2/12/79        1945     20.8     7.8    11.0     33.    240.     45.    328.    16.   193.  **
** 2/12/79        2000     20.5     7.9    10.8     35.    241.     48.    332.    17.   195.  **
** 2/12/79        2015     20.5     7.8    11.0     36.    240.     49.    328.    18.   193.  **
** 2/12/79        2030     20.5     7.7    11.0     33.    248.     45.    336.    16.   197.  **
** 2/12/79        2045     20.5     7.6    11.3     33.    246.     44.    331.    16.   194.  **
** 2/12/79        2100     20.5     7.6    11.3     33.    240.     44.    323.    16.   190.  **
** 2/12/79        2115     20.5     7.7    11.0     34.    238.     46.    323.    16.   189.  **
** 2/12/79        2130     20.5     7.5    11.3     34.    234.     45.    313.    16.   184.  **
** 2/12/79        2145     20.5     7.5    11.3     35.    225.     47.    301.    17.   176.  **
** 2/12/79        2200     20.5     7.6    11.0     34.    220.     46.    296.    16.   174.  **
** 2/12/79        2215     20.5     7.8    11.0     35.    220.     48.    301.    17.   176.  **
** 2/12/79        2230     20.5     8.0    10.8     36.    222.     50.    308.    18.   181.  **
** 2/12/79        2245     20.5     8.0    10.8     36.    228.     50.    316.    18.   186.  **
** 2/12/79        2300     19.9     8.0    10.5     36.    234.     50.    325.    18.   191.  **
** 2/12/79        2315     19.9     8.2    10.3     38.    238.     54.    335.    19.   197.  **
** 2/12/79        2330     19.9     8.1    10.5     36.    240.     50.    336.    18.   197.  **
** 2/12/79        2345     19.9     8.0    10.8     38.    240.     53.    333.    19.   196.  **
** 2/12/79        2400     19.9     7.9    10.8     38.    243.     52.    335.    19.   196.  **
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**                                  15 MIN. DATA                                      **
**                          DRY STACK GAS CONCENTRATION                               **
**                                                                                    **
**                           O2     CO2     CO      NO      CO      NO     CO     NO  **
**                  LOAD   VOL%    VOL%   PPMV    PPMV    PPMV    PPMV   NG/J   NG/J  **
**   DATE    TIME   MWTH   MEAS    MEAS   MEAS    MEAS    3%O2    3%O2                **
****************************************************************************************
** 2/13/79     15   19.9    8.3    10.3    38.    243.     54.    345.    19.   203.  **
** 2/13/79     30   19.9    8.5    10.3    38.    242.     55.    349.    20.   205.  **
** 2/13/79     45   19.9    8.6    10.3    38.    240.     55.    349.    20.   205.  **
** 2/13/79    100   19.0    8.5    10.3    38.    239.     55.    345.    20.   203.  **
** 2/13/79    115   19.0    8.5    10.3    38.    240.     55.    346.    20.   203.  **
** 2/13/79    130   19.0    8.8    10.0    38.    240.     56.    355.    20.   208.  **
** 2/13/79    145   19.0    9.0    10.0    40.    240.     60.    361.    22.   212.  **
** 2/13/79    200   19.9    9.2     9.8    40.    239.     61.    366.    22.   215.  **
** 2/13/79    215   19.9    7.8    10.8    45.    233.     61.    318.    22.   187.  **
** 2/13/79    230   19.9    7.6    11.0    43.    230.     58.    310.    21.   182.  **
** 2/13/79    245   19.9    7.6    11.0    38.    228.     51.    307.    18.   180.  **
** 2/13/79    300   20.5    7.5    11.3    36.    231.     48.    309.    17.   181.  **
** 2/13/79    315   20.5    7.3    11.5    35.    236.     46.    311.    16.   182.  **
** 2/13/79    330   20.5    7.5    11.3    36.    240.     48.    321.    17.   188.  **
** 2/13/79    345   20.5    7.0    11.8    38.    241.     49.    310.    17.   182.  **
** 2/13/79    400   21.1    7.0    11.8    40.    240.     52.    309.    18.   181.  **
** 2/13/79    415   21.1    7.0    11.8    70.    235.     90.    303.    32.   178.  **
** 2/13/79    430   21.1    7.3    11.5    60.    249.     79.    328.    28.   192.  **
** 2/13/79    445   21.1    7.5    11.3    35.    248.     47.    331.    17.   195.  **
** 2/13/79    500   20.8    7.4    11.3    33.    246.     44.    326.    16.   192.  **
** 2/13/79    515   20.8    7.3    11.3    35.    240.     46.    316.    16.   185.  **
** 2/13/79    530   20.8    7.4    11.5    35.    232.     46.    308.    17.   181.  **
** 2/13/79    545   20.8    7.3    11.5    35.    226.     46.    297.    16.   175.  **
** 2/13/79    600   21.1    7.2    11.5    40.    218.     52.    285.    19.   167.  **
** 2/13/79    615   21.1    7.0    11.5    40.    212.     52.    273.    18.   160.  **
** 2/13/79    630   21.1    6.9    11.8    50.    214.     64.    274.    23.   161.  **
** 2/13/79    645   21.1    6.9    11.8    70.    220.     89.    281.    32.   165.  **
** 2/13/79    700   22.0    6.9    11.8    70.    228.     89.    292.    32.   171.  **
** 2/13/79    715   22.0    6.7    12.1   100.    232.    126.    292.    45.   172.  **
** 2/13/79    730   22.0    7.0    11.8   100.    238.    129.    306.    46.   180.  **
** 2/13/79    745   22.0    7.1    11.5    90.    234.    117.    304.    42.   178.  **
** 2/13/79    800   20.5    7.1    11.5    90.    239.    117.    310.    42.   182.  **
** 2/13/79    815   20.5    7.0    11.5   100.    234.    129.    301.    46.   177.  **
** 2/13/79    830   20.5    7.5    11.3    36.    225.     48.    301.    17.   176.  **
** 2/13/79    845   20.5    7.8    11.0    34.    233.     46.    318.    17.   187.  **
** 2/13/79    900   20.8    7.5    11.3    33.    230.     44.    307.    16.   180.  **
** 2/13/79    915   20.8    7.3    11.0    33.    226.     43.    297.    16.   175.  **
** 2/13/79    930   20.8    7.3    11.5    33.    230.     43.    303.    16.   178.  **
** 2/13/79    945   20.8    7.5    11.3    33.    230.     44.    307.    16.   180.  **
** 2/13/79   1000   21.1    7.5    11.3    33.    230.     44.    307.    16.   180.  **
** 2/13/79   1015   21.1    7.1    11.3    35.    230.     45.    298.    16.   175.  **
** 2/13/79   1030   21.1    7.2    11.5    35.    231.     46.    302.    16.   177.  **
** 2/13/79   1045   21.1    7.7    11.0    32.    231.     43.    313.    16.   184.  **
** 2/13/79   1100   20.5    7.7    11.0    33.    230.     45.    312.    16.   183.  **
** 2/13/79   1115   20.5    7.7    10.8    33.    231.     45.    313.    16.   184.  **
** 2/13/79   1130   20.5   -1.0      .0    -1.     -1.     -1.     -1.    -1.    -1.  **
** 2/13/79   1145   20.5   -1.0      .0    -1.     -1.     -1.     -1.    -1.    -1.  **
** 2/13/79   1200   20.5   -1.0      .0    -1.     -1.     -1.     -1.    -1.    -1.  **
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15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
2/13/79	1215	20.5	7.2	11.8	38.	230.	50.	301.	18.	176.
2/13/79	1230	20.5	7.3	12.1	38.	235.	50.	309.	18.	182.
2/13/79	1245	20.5	7.3	12.1	38.	235.	50.	309.	18.	182.
2/13/79	1300	22.0	7.2	12.1	39.	240.	51.	314.	18.	184.
2/13/79	1315	22.0	7.0	12.1	40.	245.	52.	316.	18.	185.
2/13/79	1330	22.0	6.5	12.3	40.	241.	50.	300.	18.	176.
2/13/79	1345	22.0	6.3	12.6	40.	245.	49.	300.	18.	176.
2/13/79	1400	21.1	7.0	12.6	42.	246.	54.	317.	19.	186.
2/13/79	1415	21.1	7.0	12.6	34.	243.	44.	313.	16.	184.
2/13/79	1430	21.1	7.0	13.2	34.	243.	44.	313.	16.	184.
2/13/79	1445	21.1	7.1	12.1	34.	225.	44.	292.	16.	171.
2/13/79	1500	21.4	7.0	12.1	34.	218.	44.	281.	16.	165.
2/13/79	1515	21.4	7.1	12.1	42.	220.	54.	285.	19.	168.
2/13/79	1530	21.4	7.3	11.8	50.	216.	66.	284.	24.	167.
2/13/79	1545	21.4	7.3	11.8	39.	210.	51.	276.	18.	162.
2/13/79	1600	20.5	7.5	11.5	39.	210.	52.	281.	19.	165.
2/13/79	1615	20.5	7.7	11.3	35.	215.	47.	292.	17.	171.
2/13/79	1630	20.5	7.7	11.3	40.	220.	54.	298.	19.	175.
2/13/79	1645	20.5	7.8	11.5	40.	230.	55.	314.	20.	185.
2/13/79	1700	20.5	7.5	11.3	38.	230.	51.	307.	18.	180.
2/13/79	1715	20.5	7.6	11.3	40.	230.	54.	310.	19.	182.
2/13/79	1730	20.5	7.7	11.3	40.	232.	54.	315.	19.	185.
2/13/79	1745	20.5	7.5	11.8	38.	231.	51.	309.	18.	181.
2/13/79	1800	21.1	7.0	11.8	38.	233.	49.	300.	17.	176.
2/13/79	1815	21.1	6.8	12.1	38.	230.	48.	292.	17.	171.
2/13/79	1830	21.1	6.6	12.1	38.	240.	48.	300.	17.	176.
2/13/79	1845	21.1	6.8	12.3	42.	238.	53.	302.	19.	177.
2/13/79	1900	20.5	7.0	12.1	42.	235.	54.	303.	19.	178.
2/13/79	1915	20.5	7.8	11.5	40.	232.	55.	317.	20.	186.
2/13/79	1930	20.5	7.9	11.3	32.	230.	44.	317.	16.	186.
2/13/79	1945	20.5	7.0	12.1	32.	225.	41.	290.	15.	170.
2/13/79	2000	19.9	7.5	11.5	33.	225.	44.	301.	16.	176.
2/13/79	2015	19.9	8.0	11.0	33.	225.	46.	312.	16.	183.
2/13/79	2030	19.9	8.1	11.0	36.	222.	50.	310.	18.	182.
2/13/79	2045	19.9	8.1	10.8	38.	220.	53.	308.	19.	181.
2/13/79	2100	20.2	8.0	10.8	38.	220.	53.	305.	19.	179.
2/13/79	2115	20.2	8.0	11.0	34.	220.	47.	305.	17.	179.
2/13/79	2130	20.2	8.0	11.0	36.	220.	50.	305.	18.	179.
2/13/79	2145	20.2	7.9	11.0	36.	218.	50.	300.	18.	176.
2/13/79	2200	20.5	7.8	11.0	36.	213.	49.	291.	18.	171.
2/13/79	2215	20.5	7.7	11.0	35.	220.	47.	298.	17.	175.
2/13/79	2230	20.5	7.7	11.3	35.	225.	47.	305.	17.	179.
2/13/79	2245	20.5	7.6	11.3	35.	226.	47.	304.	17.	179.
2/13/79	2300	20.5	7.5	11.3	35.	230.	47.	307.	17.	180.
2/13/79	2315	20.5	7.5	11.3	33.	235.	44.	314.	16.	184.
2/13/79	2330	20.5	7.6	11.3	36.	236.	48.	318.	17.	186.
2/13/79	2345	20.5	7.5	11.3	36.	242.	48.	323.	17.	190.
2/13/79	2400	18.5	7.3	11.5	38.	235.	50.	309.	18.	182.

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**                                15 MIN. DATA                                 **
**                        DRY STACK GAS CONCENTRATION                          **
**                                                                             **
**                          O2     CO2     CO      NO      CO      NO     CO      NO      **
**                  LOAD   VOL%    VOL%   PPMV    PPMV    PPMV    PPMV   NG/J    NG/J     **
**   DATE     TIME  MWTH   MEAS    MEAS   MEAS    MEAS    3%O2    3%O2                    **
*********************************************************************************
** 2/14/79     15   18.5    6.2    12.6    36.    240.     44.    292.    16.    172.    **
** 2/14/79     30   18.5    7.3    12.1    36.    238.     47.    313.    17.    184.    **
** 2/14/79     45   18.5    7.5    11.5    32.    236.     43.    315.    15.    185.    **
** 2/14/79    100   20.5    7.7    11.3    32.    236.     43.    320.    16.    188.    **
** 2/14/79    115   20.5    7.0    12.1    60.    220.     77.    283.    28.    166.    **
** 2/14/79    130   20.5    7.3    11.8    50.    230.     66.    303.    24.    178.    **
** 2/14/79    145   20.5    7.3    11.8    32.    231.     42.    304.    15.    179.    **
** 2/14/79    200   20.5    7.5    11.3    33.    238.     44.    318.    16.    187.    **
** 2/14/79    215   20.5    7.6    11.0    38.    240.     51.    323.    18.    190.    **
** 2/14/79    230   20.5    7.7    11.0    38.    240.     52.    325.    18.    191.    **
** 2/14/79    245   20.5    7.7    11.0    40.    242.     54.    328.    19.    193.    **
** 2/14/79    300   20.5    7.5    11.3    32.    236.     43.    315.    15.    185.    **
** 2/14/79    315   20.5    8.5    10.5    32.    235.     46.    339.    17.    199.    **
** 2/14/79    330   20.5    8.3    10.8    32.    235.     45.    334.    16.    196.    **
** 2/14/79    345   20.5    8.4    10.8    34.    241.     49.    345.    17.    203.    **
** 2/14/79    400   19.0    8.3    10.8    31.    236.     44.    335.    16.    197.    **
** 2/14/79    415   19.0    8.3    10.8    31.    234.     44.    332.    16.    195.    **
** 2/14/79    430   19.0    8.3    10.8    32.    233.     45.    331.    16.    194.    **
** 2/14/79    445   19.0    8.3    10.8    32.    233.     45.    331.    16.    194.    **
** 2/14/79    500   19.0    8.3    10.5    32.    231.     45.    328.    16.    193.    **
** 2/14/79    515   19.0    8.3    10.8    32.    230.     45.    327.    16.    192.    **
** 2/14/79    530   19.0    8.3    10.8    32.    231.     45.    328.    16.    193.    **
** 2/14/79    545   19.0    8.2    10.8    32.    233.     45.    328.    16.    193.    **
** 2/14/79    600   19.0    8.1    11.0    36.    232.     50.    324.    18.    190.    **
** 2/14/79    615   19.0    8.0    11.0    36.    230.     50.    319.    18.    187.    **
** 2/14/79    630   19.0    7.8    11.0    56.    226.     77.    309.    27.    181.    **
** 2/14/79    645   19.0    7.0    12.1    46.    222.     59.    286.    21.    168.    **
** 2/14/79    700   20.8    7.0    11.8    35.    224.     45.    288.    16.    169.    **
** 2/14/79    715   20.8    7.0    11.8    34.    226.     44.    291.    16.    171.    **
** 2/14/79    730   20.8    7.0    12.1    35.    222.     45.    286.    16.    168.    **
** 2/14/79    745   20.8    7.0    11.8    34.    222.     44.    286.    16.    168.    **
** 2/14/79    800   21.4    7.0    11.8    32.    220.     41.    283.    15.    166.    **
** 2/14/79    815   21.4    6.5    12.3    35.    220.     44.    273.    16.    161.    **
** 2/14/79    830   21.4    4.0    14.1   350.    150.    371.    159.   132.     93.    **
** 2/14/79    845   21.4    8.0    11.0    32.    200.     44.    278.    16.    163.    **
** 2/14/79    900   19.0    8.3    10.8    31.    200.     44.    284.    16.    167.    **
** 2/14/79    915   19.0    8.2    10.8    32.    200.     45.    282.    16.    166.    **
** 2/14/79    930   19.0    8.3    10.8    32.    196.     45.    278.    16.    163.    **
** 2/14/79    945   19.0    8.6    10.3    32.    200.     47.    291.    17.    171.    **
** 2/14/79   1000   20.5    8.2    10.8    31.    194.     44.    273.    16.    161.    **
** 2/14/79   1015   20.5    8.0    11.0    32.    210.     44.    291.    16.    171.    **
** 2/14/79   1030   20.5    8.0    10.8    32.    215.     44.    298.    16.    175.    **
** 2/14/79   1045   20.5    8.2    10.8    33.    214.     47.    302.    17.    177.    **
** 2/14/79   1100   20.5    8.0    11.0    32.    215.     44.    298.    16.    175.    **
** 2/14/79   1115   20.5    7.3    11.8    32.    212.     42.    279.    15.    164.    **
** 2/14/79   1130   20.5    7.5    11.5    33.    215.     44.    287.    16.    169.    **
** 2/14/79   1145   20.5    7.5    11.5    33.    215.     44.    287.    16.    169.    **
** 2/14/79   1200   20.5    7.5    11.5    30.    215.     40.    287.    14.    169.    **
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**                                     15 MIN. DATA                                       
**                           DRY STACK GAS CONCENTRATION                                 **
**                                                                                       **
**                                 O2      CO2      CO      NO      CO      NO      CO      NO      **
**                        LOAD    VOL%    VOL%     PPMV    PPMV    PPMV    PPMV    NG/J    NG/J     **
**    DATE      TIME      MWTH    MEAS    MEAS     MEAS    MEAS    3%O2    3%O2                     **
*******************************************************************************************
** 2/14/79      1215      20.5     7.3    11.8      30.    214.     39.    282.     14.    165.     **
** 2/14/79      1230      20.5     7.3    11.8      32.    220.     42.    290.     15.    170.     **
** 2/14/79      1245      20.5     6.5    12.3      32.    215.     40.    267.     14.    157.     **
** 2/14/79      1300      20.5     6.5    12.3      32.    210.     40.    261.     14.    153.     **
** 2/14/79      1315      20.5     6.5    12.3      30.    210.     37.    261.     13.    153.     **
** 2/14/79      1330      20.5     6.7    12.1      30.    208.     38.    262.     14.    154.     **
** 2/14/79      1345      20.5     6.8    12.1      30.    204.     38.    259.     14.    152.     **
** 2/14/79      1400      20.5     6.6    12.3      30.    205.     38.    257.     13.    151.     **
** 2/14/79      1415      20.5     6.6    12.3      30.    204.     38.    255.     13.    150.     **
** 2/14/79      1430      20.5     6.7    12.3      30.    200.     38.    252.     14.    148.     **
** 2/14/79      1445      20.5     7.2    11.8      30.    200.     39.    261.     14.    153.     **
** 2/14/79      1500      19.9     7.2    11.8      31.    200.     41.    261.     14.    153.     **
** 2/14/79      1515      19.9     7.2    11.8      32.    200.     42.    261.     15.    153.     **
** 2/14/79      1530      19.9     7.3    11.8      32.    202.     42.    266.     15.    156.     **
** 2/14/79      1545      19.9     7.4    11.5      32.    204.     42.    270.     15.    159.     **
** 2/14/79      1600      19.0     7.5    11.3      36.    208.     48.    278.     17.    163.     **
** 2/14/79      1615      19.0     7.8    11.0      34.    208.     46.    288.     17.    167.     **
** 2/14/79      1630      19.0     7.7    11.0      36.    206.     49.    279.     17.    164.     **
** 2/14/79      1645      19.0     7.7    11.3      36.    200.     49.    271.     17.    159.     **
** 2/14/79      1700      19.0     9.5     9.8      70.    160.    110.    251.     39.    148.     **
** 2/14/79      1715      19.0     6.5    12.3      36.    210.     45.    261.     16.    153.     **
** 2/14/79      1730      19.0     6.9    12.1      36.    212.     46.    271.     16.    159.     **
** 2/14/79      1745      19.0     6.8    12.1      35.    210.     44.    267.     16.    157.     **
** 2/14/79      1800      21.1     6.8    12.3      35.    208.     44.    264.     16.    155.     **
** 2/14/79      1815      21.1     6.5    12.3      35.    206.     44.    256.     16.    150.     **
** 2/14/79      1830      21.1     6.4    12.6      36.    206.     44.    254.     16.    149.     **
** 2/14/79      1845      21.1     6.3    12.6      38.    208.     47.    255.     17.    150.     **
** 2/14/79      1900      20.8     6.3    12.6      35.    210.     43.    257.     15.    151.     **
** 2/14/79      1915      20.8     6.3    12.6      40.    210.     49.    257.     18.    151.     **
** 2/14/79      1930      20.8     6.3    12.9      35.    206.     43.    253.     15.    148.     **
** 2/14/79      1945      20.8     6.2    12.9      35.    200.     43.    244.     15.    143.     **
** 2/14/79      2000      21.1     6.3    12.6      36.    207.     44.    254.     16.    149.     **
** 2/14/79      2015      21.1     6.4    12.3      42.    206.     52.    254.     19.    149.     **
** 2/14/79      2030      21.1     6.4    12.3      39.    198.     48.    244.     17.    144.     **
** 2/14/79      2045      21.1     6.4    12.6      39.    196.     48.    242.     17.    142.     **
** 2/14/79      2100      19.0     6.3    12.9      33.    190.     40.    233.     14.    137.     **
** 2/14/79      2115      19.0     6.0    12.9      70.    175.     84.    210.     30.    123.     **
** 2/14/79      2130      19.0     6.9    12.1      65.    190.     83.    243.     30.    143.     **
** 2/14/79      2145      19.0     6.4    12.6      60.    194.     74.    239.     26.    141.     **
** 2/14/79      2200      17.6     6.5    12.3      50.    194.     62.    241.     22.    142.     **
** 2/14/79      2215      17.6     6.6    12.3      48.    196.     60.    245.     21.    144.     **
** 2/14/79      2230      17.6     6.6    12.3      50.    200.     63.    250.     22.    147.     **
** 2/14/79      2245      17.6     6.9    11.8      36.    200.     46.    256.     16.    150.     **
** 2/14/79      2300      17.0     6.5    12.3      38.    200.     47.    249.     17.    146.     **
** 2/14/79      2315      17.0     6.7    12.3      40.    196.     50.    247.     18.    145.     **
** 2/14/79      2330      17.0     6.5    12.3      60.    196.     75.    244.     27.    143.     **
** 2/14/79      2345      17.0     6.5    12.3      50.    199.     62.    247.     22.    145.     **
** 2/14/79      2400      17.0     6.4    12.3      32.    194.     40.    239.     14.    141.     **
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                                  15 MIN. DATA                                      **
**                         DRY STACK GAS CONCENTRATION                              **
**                                                                                  **
**                             O2     CO2      CO      NO      CO      NO      CO      NO  **
**                   LOAD    VOL%    VOL%    PPMV    PPMV    PPMV    PPMV    NG/J    NG/J  **
**  DATE     TIME    MWTH    MEAS    MEAS    MEAS    MEAS    3%O2    3%O2                  **
*******************************************************************************************
** 2/15/79     15    17.0     6.4    12.6     33.    194.     41.    239.     15.    141.  **
** 2/15/79     30    17.0     6.5    12.6     32.    185.     40.    230.     14.    135.  **
** 2/15/79     45    17.0     6.5    12.3     50.    192.     62.    239.     22.    140.  **
** 2/15/79    100    17.6     6.4    12.6     40.    194.     49.    239.     18.    141.  **
** 2/15/79    115    17.6     6.3    12.9     32.    206.     39.    253.     14.    148.  **
** 2/15/79    130    17.6     6.4    12.6     32.    206.     40.    254.     14.    149.  **
** 2/15/79    145    17.6     6.3    12.6     33.    210.     40.    257.     14.    151.  **
** 2/15/79    200    17.3     6.4    12.6     32.    214.     40.    264.     14.    155.  **
** 2/15/79    215    17.3     6.5    12.3     32.    216.     40.    268.     14.    158.  **
** 2/15/79    230    17.3     6.5    12.3     32.    220.     40.    273.     14.    161.  **
** 2/15/79    245    17.3     6.5    12.3     32.    219.     40.    272.     14.    160.  **
** 2/15/79    300    17.6     6.5    12.3     31.    220.     39.    273.     14.    161.  **
** 2/15/79    315    17.6     6.6    12.3     32.    210.     40.    263.     14.    154.  **
** 2/15/79    330    17.6     6.6    12.3     34.    210.     43.    263.     15.    154.  **
** 2/15/79    345    17.6     6.9    11.8     32.    214.     41.    274.     15.    161.  **
** 2/15/79    400    17.0     6.5    12.3     32.    210.     40.    261.     14.    153.  **
** 2/15/79    415    17.0     6.5    12.3     32.    209.     40.    260.     14.    153.  **
** 2/15/79    430    17.0     6.5    12.3     32.    205.     40.    255.     14.    150.  **
** 2/15/79    445    17.0     6.5    12.3     33.    203.     41.    252.     15.    148.  **
** 2/15/79    500    16.1     6.5    12.3     30.    200.     37.    249.     13.    146.  **
** 2/15/79    515    16.1     6.3    12.6     39.    198.     48.    243.     17.    143.  **
** 2/15/79    530    16.1     6.2    12.9     34.    198.     41.    241.     15.    142.  **
** 2/15/79    545    16.1     6.2    12.9     34.    192.     41.    234.     15.    137.  **
** 2/15/79    600    17.6     6.2    12.9     38.    191.     46.    233.     17.    137.  **
** 2/15/79    615    17.6     6.2    12.9     41.    195.     50.    237.     18.    139.  **
** 2/15/79    630    17.6     6.2    12.9     32.    205.     39.    250.     14.    147.  **
** 2/15/79    645    17.6     7.0    12.3     32.    210.     41.    270.     15.    159.  **
** 2/15/79    700    17.6     7.7    11.3     32.    210.     43.    285.     16.    167.  **
** 2/15/79    715    17.6     7.5    11.5     30.    212.     40.    283.     14.    166.  **
** 2/15/79    730    17.6     7.5    11.5     30.    210.     40.    281.     14.    165.  **
** 2/15/79    745    17.6     7.5    11.5     32.    210.     43.    281.     15.    165.  **
** 2/15/79    800    18.5     7.5    11.5     32.    215.     43.    287.     15.    169.  **
** 2/15/79    815    18.5     7.6    11.5     32.    215.     43.    289.     15.    170.  **
** 2/15/79    830    18.5     7.8    11.3     32.    216.     44.    295.     16.    173.  **
** 2/15/79    845    18.5     7.5    11.5     32.    214.     43.    286.     15.    168.  **
** 2/15/79    900    19.6     7.5    11.5     32.    215.     43.    287.     15.    169.  **
** 2/15/79    915    19.6     7.5    11.5     32.    218.     43.    291.     15.    171.  **
** 2/15/79    930    19.6     7.7    11.3     33.    220.     45.    298.     16.    175.  **
** 2/15/79    945    19.6     7.7    11.3     33.    210.     45.    285.     16.    167.  **
** 2/15/79   1000    18.2     7.5    11.5     38.    210.     51.    281.     18.    165.  **
** 2/15/79   1015    18.2     7.6    11.5     34.    210.     46.    283.     16.    166.  **
** 2/15/79   1030    18.2     7.5    11.5     34.    210.     45.    281.     16.    165.  **
** 2/15/79   1045    18.2     7.5    11.5     35.    210.     47.    281.     17.    165.  **
** 2/15/79   1100    19.0     7.6    11.5     32.    200.     43.    269.     15.    158.  **
** 2/15/79   1115    19.0     7.7    11.3     32.    195.     43.    264.     16.    155.  **
** 2/15/79   1130    19.0     7.9    11.0     38.    200.     52.    275.     19.    162.  **
** 2/15/79   1145    19.0     7.3    11.8     34.    200.     45.    263.     16.    155.  **
** 2/15/79   1200    18.5     7.8    11.8     32.    200.     42.    265.     15.    156.  ***
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15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
2/15/79	1215	18.5	7.5	11.5	32.	203.	43.	271.	15.	159.
2/15/79	1230	18.5	7.2	11.8	32.	205.	42.	268.	15.	157.
2/15/79	1245	18.5	7.4	11.8	31.	206.	41.	273.	15.	160.
2/15/79	1300	19.0	7.5	11.5	30.	204.	40.	273.	14.	160.
2/15/79	1315	19.0	7.5	11.3	30.	208.	40.	278.	14.	163.
2/15/79	1330	19.0	7.5	11.5	30.	208.	40.	278.	14.	163.
2/15/79	1345	19.0	7.5	11.5	32.	210.	43.	281.	15.	165.
2/15/79	1400	18.2	7.6	11.5	32.	209.	43.	281.	15.	165.
2/15/79	1415	18.2	7.8	11.3	32.	210.	44.	287.	16.	168.
2/15/79	1430	18.2	8.2	11.0	32.	210.	45.	296.	16.	174.
2/15/79	1445	18.2	8.0	10.8	32.	210.	44.	291.	16.	171.
2/15/79	1500	18.5	7.7	11.0	32.	208.	43.	282.	16.	166.
2/15/79	1515	18.5	8.0	10.8	32.	205.	44.	284.	16.	167.
2/15/79	1530	18.5	8.1	10.8	34.	202.	48.	282.	17.	166.
2/15/79	1545	18.5	8.1	10.8	32.	205.	45.	287.	16.	168.
2/15/79	1600	18.5	8.0	11.0	33.	205.	46.	284.	16.	167.
2/15/79	1615	18.5	7.9	11.0	32.	210.	44.	289.	16.	170.
2/15/79	1630	18.5	8.0	10.8	32.	205.	44.	284.	16.	167.
2/15/79	1645	18.5	8.1	10.8	32.	195.	45.	273.	16.	160.
2/15/79	1700	18.2	8.5	10.5	32.	210.	46.	303.	17.	178.
2/15/79	1715	18.2	8.1	10.8	32.	206.	45.	288.	16.	169.
2/15/79	1730	18.2	8.2	11.0	36.	200.	51.	282.	18.	166.
2/15/79	1745	18.2	8.6	10.3	36.	221.	52.	322.	19.	189.
2/15/79	1800	19.3	8.8	10.3	38.	226.	56.	334.	20.	196.
2/15/79	1815	19.3	7.3	11.3	38.	232.	50.	305.	18.	179.
2/15/79	1830	19.3	7.0	12.1	38.	225.	49.	290.	17.	170.
2/15/79	1845	19.3	7.4	12.1	35.	235.	46.	312.	17.	183.
2/15/79	1900	18.2	7.0	12.1	35.	231.	45.	297.	16.	175.
2/15/79	1915	18.2	7.1	12.1	34.	230.	44.	298.	16.	175.
2/15/79	1930	18.2	8.0	11.3	32.	230.	44.	319.	16.	187.
2/15/79	1945	18.2	6.5	12.6	32.	225.	40.	280.	14.	164.
2/15/79	2000	17.3	6.4	12.9	31.	220.	38.	272.	14.	159.
2/15/79	2015	17.3	6.7	12.6	31.	216.	39.	272.	14.	160.
2/15/79	2030	17.3	6.8	12.3	30.	212.	38.	269.	14.	158.
2/15/79	2045	17.3	6.5	12.6	30.	210.	37.	261.	13.	153.
2/15/79	2100	17.3	5.9	12.9	30.	190.	36.	227.	13.	133.
2/15/79	2115	17.3	5.8	13.2	60.	206.	71.	244.	25.	143.
2/15/79	2130	17.3	6.5	12.6	50.	209.	62.	260.	22.	153.
2/15/79	2145	17.3	6.5	12.6	32.	210.	40.	261.	14.	153.
2/15/79	2200	17.6	6.6	12.6	38.	210.	48.	263.	17.	154.
2/15/79	2215	17.6	6.5	12.6	40.	220.	50.	273.	18.	161.
2/15/79	2230	17.6	6.5	12.6	39.	218.	48.	271.	17.	159.
2/15/79	2245	17.6	6.6	12.6	32.	220.	40.	275.	14.	162.
2/15/79	2300	17.6	6.5	12.6	36.	222.	45.	276.	16.	162.
2/15/79	2315	17.6	6.4	12.6	36.	220.	44.	272.	16.	159.
2/15/79	2330	17.6	6.3	12.9	32.	221.	39.	271.	14.	159.
2/15/79	2345	17.6	6.1	12.9	31.	221.	37.	267.	13.	157.
2/15/79	2400	19.0	6.1	13.2	32.	228.	39.	276.	14.	162.

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**                              15 MIN. DATA                                       **
**                      DRY STACK GAS CONCENTRATION                                **
**                                                                                 **
**                         O2     CO2     CO     NO     CO     NO     CO     NO    **
**                 LOAD   VOL%   VOL%   PPMV   PPMV   PPMV   PPMV   NG/J   NG/J   **
**   DATE    TIME  MWTH   MEAS   MEAS   MEAS   MEAS   3%O2   3%O2                  **
*************************************************************************************
** 2/16/79     15  19.0    6.1   13.2    32.   225.    39.   272.    14.   160.   **
** 2/16/79     30  19.0    6.1   13.2    32.   215.    39.   260.    14.   153.   **
** 2/16/79     45  19.0    6.5   12.6    32.   222.    40.   276.    14.   162.   **
** 2/16/79    100  19.0    6.2   13.2    39.   221.    47.   269.    17.   158.   **
** 2/16/79    115  19.0    6.2   13.2    42.   210.    51.   256.    18.   150.   **
** 2/16/79    130  19.0    6.0   13.5    60.   218.    72.   262.    26.   154.   **
** 2/16/79    145  19.0    6.0   13.5    32.   210.    38.   252.    14.   148.   **
** 2/16/79    200  19.6    6.0   13.5    34.   210.    41.   252.    13.   148.   **
** 2/16/79    215  19.6    6.0   13.2    34.   210.    41.   252.    15.   148.   **
** 2/16/79    230  19.6    6.1   13.2    32.   210.    39.   254.    14.   149.   **
** 2/16/79    245  19.6    6.2   12.9    30.   210.    37.   256.    13.   150.   **
** 2/16/79    300  19.0    6.3   12.9    30.   210.    37.   257.    13.   151.   **
** 2/16/79    315  19.0    6.3   12.9    30.   208.    37.   255.    13.   150.   **
** 2/16/79    330  19.0    6.4   13.2    33.   207.    41.   256.    15.   150.   **
** 2/16/79    345  19.0    6.0   13.5    34.   206.    41.   247.    15.   145.   **
** 2/16/79    400  19.0    6.0   13.2    34.   200.    41.   240.    15.   141.   **
** 2/16/79    415  19.0    7.0   12.1    40.   198.    52.   255.    18.   150.   **
** 2/16/79    430  19.0    6.9   12.6    32.   196.    41.   251.    15.   147.   **
** 2/16/79    445  19.0    6.8   12.6    30.   194.    38.   246.    14.   145.   **
** 2/16/79    500  19.0    6.8   12.3    30.   194.    38.   246.    14.   145.   **
** 2/16/79    515  19.0    6.8   12.3    30.   194.    38.   246.    14.   145.   **
** 2/16/79    530  19.0    7.5   11.8    30.   195.    40.   260.    14.   153.   **
** 2/16/79    545  19.0    7.6   11.5    30.   193.    40.   260.    14.   153.   **
** 2/16/79    600  19.0    7.5   11.8    30.   198.    40.   264.    14.   155.   **
** 2/16/79    615  19.0    7.5   12.1    30.   200.    40.   267.    14.   157.   **
** 2/16/79    630  19.0    7.5   11.5    32.   200.    43.   267.    15.   157.   **
** 2/16/79    645  19.0    7.6   11.5    32.   200.    43.   269.    15.   158.   **
** 2/16/79    700  19.0    7.9   11.5    30.   225.    41.   310.    15.   182.   **
** 2/16/79    715  19.0    7.5   11.5    30.   210.    40.   281.    14.   165.   **
** 2/16/79    730  19.0    8.0   11.3    30.   210.    42.   291.    15.   171.   **
** 2/16/79    745  19.0    8.0   11.5    30.   212.    42.   294.    15.   173.   **
** 2/16/79    800  19.0    8.0   11.3    31.   213.    43.   296.    15.   174.   **
** 2/16/79    815  19.0    8.0   11.3    30.   214.    42.   297.    15.   174.   **
** 2/16/79    830  19.0    8.0   11.3    30.   215.    42.   298.    15.   175.   **
** 2/16/79    845  19.0    8.1   11.3    30.   215.    42.   301.    15.   177.   **
** 2/16/79    900  18.2    8.1   11.3    31.   215.    43.   301.    15.   177.   **
** 2/16/79    915  18.2    8.1   11.8    31.   220.    43.   308.    15.   181.   **
** 2/16/79    930  18.2    8.0   11.8    31.   222.    43.   308.    15.   181.   **
** 2/16/79    945  18.2    8.0   11.5    32.   220.    44.   305.    16.   179.   **
** 2/16/79   1000  19.0    8.0   11.8    32.   221.    44.   307.    16.   180.   **
** 2/16/79   1015  19.0    8.0   11.5    32.   220.    44.   305.    16.   179.   **
** 2/16/79   1030  19.0    8.0   11.5    32.   216.    44.   300.    16.   176.   **
** 2/16/79   1045  19.0    8.1   11.3    32.   220.    45.   308.    16.   181.   **
** 2/16/79   1100  18.2   -1.0     .0    -1.    -1.    -1.    -1.    -1.    -1.   **
** 2/16/79   1115  18.2   -1.0     .0    -1.    -1.    -1.    -1.    -1.    -1.   **
** 2/16/79   1130  18.2    8.0   11.5    40.   218.    56.   302.    20.   178.   **
** 2/16/79   1145  18.2    8.0   11.3    30.   218.    42.   302.    15.   178.   **
** 2/16/79   1200  17.6    8.0   11.8    30.   216.    42.   300.    15.   176.   **
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**                                 15 MIN. DATA                                        **
**                         DRY STACK GAS CONCENTRATION                                 **
**                                                                                     **
**                         O2     CO2     CO      NO      CO      NO      CO     NO    **
**                  LOAD   VOL%   VOL%    PPMV    PPMV    PPMV    PPMV    NG/J   NG/J  **
**   DATE    TIME   MWTH   MEAS   MEAS    MEAS    MEAS    3%O2    3%O2                 **
*****************************************************************************************
** 2/16/79   1215   17.6   -1.0     .0     -1.     -1.     -1.     -1.    -1.    -1.   **
** 2/16/79   1230     .0     .0     .0      0.      0.      0.      0.     0.     0.   **
** 2/16/79   1245   17.6   -1.0     .0     -1.     -1.     -1.     -1.    -1.    -1.   **
** 2/16/79   1300   17.3    7.3   11.8     32.    215.     42.    283.    15.   166.   **
** 2/16/79   1315   17.3    7.3   11.8     30.    212.     39.    279.    14.   164.   **
** 2/16/79   1330   17.3    7.3   12.1     30.    215.     39.    283.    14.   166.   **
** 2/16/79   1345   17.3    7.0   12.1     30.    214.     39.    276.    14.   162.   **
** 2/16/79   1400   17.6    7.0   12.1     29.    222.     37.    286.    13.   168.   **
** 2/16/79   1415   17.6    6.9   12.3     30.    222.     38.    284.    14.   167.   **
** 2/16/79   1430   17.6    7.0   12.1     30.    220.     39.    283.    14.   166.   **
** 2/16/79   1445   17.6    7.0   12.1     30.    221.     39.    285.    14.   167.   **
** 2/16/79   1500   17.0    7.4   11.8     30.    220.     40.    292.    14.   171.   **
** 2/16/79   1515   17.0    7.5   11.5     29.    220.     39.    294.    14.   173.   **
** 2/16/79   1530   17.0    7.5   11.5     29.    215.     39.    287.    14.   169.   **
** 2/16/79   1545   17.0    7.5   11.5     30.    221.     40.    295.    14.   173.   **
** 2/16/79   1600   17.6    7.6   11.5     30.    220.     40.    296.    14.   174.   **
** 2/16/79   1615   17.6    7.5   11.5     30.    222.     40.    297.    14.   174.   **
** 2/16/79   1630   17.6    7.5   11.5     30.    200.     40.    267.    14.   157.   **
** 2/16/79   1645   17.6    9.5   10.0     30.    212.     47.    333.    17.   195.   **
** 2/16/79   1700   18.2    6.3   12.6     30.    206.     37.    253.    13.   148.   **
** 2/16/79   1715   18.2    6.0   13.2     39.    190.     47.    228.    17.   134.   **
** 2/16/79   1730   18.2    6.0   13.5     42.    200.     50.    240.    18.   141.   **
** 2/16/79   1745   18.2    5.0   14.1     38.    200.     43.    225.    15.   132.   **
** 2/16/79   1800   17.9    6.0   13.5     39.    204.     47.    245.    17.   144.   **
** 2/16/79   1815   17.9    6.3   13.2     39.    206.     48.    253.    17.   148.   **
** 2/16/79   1830   17.9    6.4   13.2     39.    210.     48.    259.    17.   152.   **
** 2/16/79   1845   17.9    6.5   12.6     39.    210.     48.    261.    17.   153.   **
** 2/16/79   1900   18.2    6.7   12.3     39.    210.     49.    265.    18.   155.   **
** 2/16/79   1915   18.2    6.5   12.6     50.    208.     62.    259.    22.   152.   **
** 2/16/79   1930   18.2    6.3   12.9     40.    206.     49.    253.    18.   148.   **
** 2/16/79   1945   18.2    5.9   13.2     40.    208.     48.    248.    17.   146.   **
** 2/16/79   2000   22.9    5.5   13.8     40.    200.     46.    232.    17.   136.   **
** 2/16/79   2015   22.9    5.0   14.1     50.    206.     56.    232.    20.   136.   **
** 2/16/79   2030   22.9    6.1   13.5     60.    210.     73.    254.    26.   149.   **
** 2/16/79   2045   22.9    6.2   13.2     40.    218.     49.    265.    17.   156.   **
** 2/16/79   2100   22.0    6.3   13.2     40.    220.     49.    270.    18.   158.   **
** 2/16/79   2115   22.0    6.3   12.6     40.    220.     49.    270.    18.   158.   **
** 2/16/79   2130   22.0    6.5   12.3     40.    220.     50.    273.    18.   161.   **
** 2/16/79   2145   22.0    6.8   12.6     40.    223.     51.    283.    18.   166.   **
** 2/16/79   2200   22.0    6.5   12.3     35.    228.     44.    283.    16.   166.   **
** 2/16/79   2215   22.0    6.6   12.3     39.    230.     49.    288.    17.   169.   **
** 2/16/79   2230   22.0    6.7   12.3     45.    233.     57.    294.    20.   172.   **
** 2/16/79   2245   22.0    6.5   12.6     45.    240.     56.    298.    20.   175.   **
** 2/16/79   2300   22.0    6.5   12.6     42.    238.     52.    296.    19.   174.   **
** 2/16/79   2315   22.0    6.5   12.3     42.    238.     52.    296.    19.   174.   **
** 2/16/79   2330   22.0    6.6   12.1     42.    240.     53.    300.    19.   176.   **
** 2/16/79   2345   22.0    6.5   12.3     40.    232.     50.    288.    18.   169.   **
** 2/16/79   2400   22.0    6.4   12.6     40.    229.     49.    283.    18.   166.   **
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**                                        15 MIN. DATA                                **
**                                 DRY STACK GAS CONCENTRATION                        **
**                                                                                    **
**                            O2      CO2     CO      NO      CO      NO     CO     NO     **
**                    LOAD    VOL%    VOL%    PPMV    PPMV    PPMV    PPMV   NG/J   NG/J   **
**   DATE      TIME   MWTH    MEAS    MEAS    MEAS    MEAS    3%O2    3%O2                 **
****************************************************************************************
** 2/17/79       15   22.0     6.4    12.9     40.    220.     49.    272.    18.   159.   **
** 2/17/79       30   22.0     6.5    12.3     40.    220.     50.    273.    18.   161.   **
** 2/17/79       45   22.0     6.3    12.6     44.    215.     54.    264.    19.   155.   **
** 2/17/79      100   22.6     6.2    12.6     46.    205.     56.    250.    20.   147.   **
** 2/17/79      115   22.6     5.9    12.9     56.    212.     67.    253.    24.   149.   **
** 2/17/79      130   22.6     6.0    13.2     60.    210.     72.    252.    26.   148.   **
** 2/17/79      145   22.6     5.9    13.2     60.    212.     72.    253.    26.   149.   **
** 2/17/79      200   22.9     5.8    13.5     60.    215.     71.    255.    25.   150.   **
** 2/17/79      215   22.9     5.9    13.2     50.    220.     60.    263.    21.   154.   **
** 2/17/79      230   22.9     6.0    12.9     59.    225.     71.    270.    25.   159.   **
** 2/17/79      245   22.9     6.0    12.9     55.    226.     66.    272.    24.   159.   **
** 2/17/79      300   22.0     6.0    12.9     55.    228.     66.    274.    24.   161.   **
** 2/17/79      315   22.0     6.0    12.9     60.    228.     72.    274.    26.   161.   **
** 2/17/79      330   22.0     6.1    12.9     55.    228.     67.    276.    24.   162.   **
** 2/17/79      345   22.0     6.0    12.9     60.    228.     72.    274.    26.   161.   **
** 2/17/79      400   22.6     6.1    12.9     60.    230.     73.    278.    26.   163.   **
** 2/17/79      415   22.6     6.0    12.6     60.    230.     72.    276.    26.   162.   **
** 2/17/79      430   22.6     6.1    12.6     60.    215.     73.    260.    26.   153.   **
** 2/17/79      445   22.6     6.4    12.6     50.    220.     62.    272.    22.   159.   **
** 2/17/79      500   22.3     6.3    12.6     50.    222.     61.    272.    22.   160.   **
** 2/17/79      515   22.3     6.3    12.3     50.    220.     61.    270.    22.   158.   **
** 2/17/79      530   22.3     6.0    12.9     48.    214.     58.    257.    21.   151.   **
** 2/17/79      545   22.3     6.0    12.9     42.    220.     50.    264.    18.   155.   **
** 2/17/79      600   22.6     6.5    12.3     50.    215.     62.    267.    22.   157.   **
** 2/17/79      615   22.6     6.0    12.6     50.    214.     60.    257.    21.   151.   **
** 2/17/79      630   22.6     6.1    12.6     50.    212.     60.    256.    22.   151.   **
** 2/17/79      645   22.6     6.1    12.6     50.    210.     60.    254.    22.   149.   **
** 2/17/79      700   22.3     6.1    12.6     50.    210.     60.    254.    22.   149.   **
** 2/17/79      715   22.3     6.0    12.9     50.    214.     60.    257.    21.   151.   **
** 2/17/79      730   22.3     6.0    12.9     50.    210.     60.    252.    21.   148.   **
** 2/17/79      745   22.3     6.1    12.6     50.    210.     60.    254.    22.   149.   **
** 2/17/79      800   22.0     6.1    12.6     58.    200.     70.    242.    25.   142.   **
** 2/17/79      815   22.0     6.2    12.6     50.    204.     61.    248.    22.   146.   **
** 2/17/79      830   22.0     6.0    12.9     50.    204.     60.    245.    21.   144.   **
** 2/17/79      845   22.0     6.1    12.6     50.    204.     60.    247.    22.   145.   **
** 2/17/79      900   22.0     6.0    12.9     50.    204.     60.    245.    21.   144.   **
** 2/17/79      915   22.0     6.0    12.9     50.    210.     60.    252.    21.   148.   **
** 2/17/79      930   22.0     6.0    12.9     48.    210.     58.    252.    21.   148.   **
** 2/17/79      945   22.0     6.0    12.9     48.    216.     58.    259.    21.   152.   **
** 2/17/79     1000   22.9     6.1    12.6     49.    224.     59.    271.    21.   159.   **
** 2/17/79     1015   22.9     5.8    13.2     50.    226.     59.    268.    21.   157.   **
** 2/17/79     1050   22.9     5.9    13.2     50.    230.     60.    274.    21.   161.   **
** 2/17/79     1045   22.9     6.0    12.9     50.    235.     60.    282.    21.   166.   **
** 2/17/79     1100   22.6     5.9    12.9     50.    240.     60.    286.    21.   168.   **
** 2/17/79     1115   22.6     6.0    12.9     42.    240.     50.    288.    18.   169.   **
** 2/17/79     1130   22.6     6.0    12.6     42.    240.     50.    288.    18.   169.   **
** 2/17/79     1145   22.6     6.0    12.9     42.    235.     50.    282.    18.   166.   **
** 2/17/79     1200   20.5     6.5    12.3     42.    235.     52.    292.    19.   172.   **
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15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
2/17/79	1215	20.5	6.5	12.3	42.	225.	52.	280.	19.	164.
2/17/79	1230	20.5	6.7	12.1	42.	225.	53.	284.	19.	167.
2/17/79	1245	20.5	6.8	11.8	42.	200.	53.	254.	19.	149.
2/17/79	1300	22.0	7.5	11.0	42.	200.	56.	267.	20.	157.
2/17/79	1315	22.0	6.0	12.6	43.	212.	52.	255.	18.	150.
2/17/79	1330	22.0	6.0	12.6	44.	210.	53.	252.	19.	148.
2/17/79	1345	22.0	6.1	12.6	48.	210.	58.	254.	21.	149.
2/17/79	1400	22.3	6.0	12.6	48.	210.	58.	252.	21.	148.
2/17/79	1415	22.3	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
2/17/79	1430	22.3	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
2/17/79	1445	22.3	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
2/17/79	1500	22.9	6.5	12.3	65.	230.	81.	286.	29.	168.
2/17/79	1515	22.9	6.3	12.6	70.	230.	86.	282.	31.	166.
2/17/79	1530	22.9	6.0	13.2	75.	230.	90.	276.	32.	162.
2/17/79	1545	22.9	6.0	12.9	75.	230.	90.	276.	32.	162.
2/17/79	1600	22.9	6.3	12.6	60.	230.	74.	282.	26.	166.
2/17/79	1615	22.9	6.0	12.9	42.	235.	50.	282.	18.	166.
2/17/79	1630	22.9	6.1	12.6	42.	234.	51.	283.	18.	166.
2/17/79	1645	22.9	6.3	12.6	44.	230.	54.	282.	19.	166.
2/17/79	1700	19.0	6.0	12.9	44.	230.	53.	276.	19.	162.
2/17/79	1715	19.0	6.1	12.6	50.	224.	60.	271.	22.	159.
2/17/79	1730	19.0	6.2	12.6	50.	220.	61.	268.	22.	157.
2/17/79	1745	19.0	7.5	11.5	40.	210.	53.	281.	19.	165.
2/17/79	1800	19.3	7.5	11.3	32.	215.	43.	287.	15.	169.
2/17/79	1815	19.3	7.6	11.3	34.	212.	46.	285.	16.	168.
2/17/79	1830	19.3	8.0	10.8	34.	216.	47.	300.	17.	176.
2/17/79	1845	19.3	7.2	12.1	34.	212.	44.	277.	16.	163.
2/17/79	1900	20.2	7.0	12.1	35.	212.	45.	273.	16.	160.
2/17/79	1915	20.2	7.1	11.8	34.	212.	44.	275.	16.	161.
2/17/79	1930	20.2	7.0	11.8	35.	212.	45.	273.	16.	160.
2/17/79	1945	20.2	7.2	11.8	35.	222.	46.	290.	16.	170.
2/17/79	2000	19.9	6.4	12.6	35.	224.	43.	277.	15.	162.
2/17/79	2015	19.9	6.0	13.2	40.	225.	48.	270.	17.	159.
2/17/79	2030	19.9	6.2	12.3	40.	225.	49.	274.	17.	161.
2/17/79	2045	19.9	6.5	12.3	38.	232.	47.	288.	17.	169.
2/17/79	2100	19.9	6.7	12.1	37.	232.	47.	292.	17.	172.
2/17/79	2115	19.9	6.8	12.1	37.	242.	47.	307.	17.	180.
2/17/79	2130	19.9	6.7	12.3	32.	245.	40.	309.	14.	181.
2/17/79	2145	19.9	6.7	12.1	35.	240.	44.	303.	16.	178.
2/17/79	2200	19.9	6.8	12.1	35.	235.	44.	298.	16.	175.
2/17/79	2215	19.9	7.0	11.8	34.	232.	44.	299.	16.	175.
2/17/79	2230	19.9	6.6	12.3	35.	230.	44.	288.	16.	169.
2/17/79	2245	19.9	6.7	12.1	32.	228.	40.	287.	14.	169.
2/17/79	2300	20.5	6.7	12.1	32.	222.	40.	280.	14.	164.
2/17/79	2315	20.5	6.5	12.3	32.	220.	40.	273.	14.	161.
2/17/79	2330	20.5	6.5	12.3	32.	220.	40.	273.	14.	161.
2/17/79	2345	20.5	6.5	12.6	32.	221.	40.	275.	14.	161.
2/17/79	2400	21.1	6.0	12.9	40.	226.	48.	272.	17.	159.

15 MIN. DATA
DRY STACK GAS CONCENTRATIUM

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
2/18/79	15	21.1	6.0	12.9	40.	228.	48.	274.	17.	161.
2/18/79	30	21.1	5.9	13.2	50.	231.	60.	276.	21.	162.
2/18/79	45	21.1	5.7	13.5	56.	231.	66.	272.	24.	160.
2/18/79	100	21.1	5.7	13.5	60.	234.	71.	276.	25.	162.
2/18/79	115	21.1	6.0	12.9	90.	240.	108.	288.	39.	169.
2/18/79	130	21.1	6.0	12.9	90.	240.	108.	288.	39.	169.
2/18/79	145	21.1	6.0	12.9	70.	234.	84.	281.	30.	165.
2/18/79	200	21.1	6.0	12.9	34.	234.	41.	281.	15.	165.
2/18/79	215	21.1	5.9	13.2	33.	230.	39.	274.	14.	161.
2/18/79	230	21.1	5.9	12.9	34.	226.	41.	270.	15.	158.
2/18/79	245	21.1	6.0	12.9	33.	224.	40.	269.	14.	158.
2/18/79	300	21.4	6.0	12.9	34.	222.	41.	267.	15.	157.
2/18/79	315	21.4	6.0	12.6	35.	220.	42.	264.	15.	155.
2/18/79	330	21.4	5.7	13.2	40.	218.	47.	257.	17.	151.
2/18/79	345	21.4	6.0	12.9	40.	216.	48.	259.	17.	152.
2/18/79	400	20.5	5.7	12.9	40.	212.	47.	250.	17.	147.
2/18/79	415	20.5	6.0	12.9	34.	210.	41.	252.	15.	148.
2/18/79	430	20.5	6.0	12.6	50.	210.	60.	252.	21.	148.
2/18/79	445	20.5	6.0	12.6	50.	205.	60.	246.	21.	145.
2/18/79	500	20.5	6.0	12.9	46.	210.	55.	252.	20.	148.
2/18/79	515	20.5	6.0	12.6	42.	210.	50.	252.	18.	148.
2/18/79	530	20.5	6.1	12.3	50.	210.	60.	254.	22.	149.
2/18/79	545	20.5	7.0	11.3	32.	212.	41.	273.	15.	160.
2/18/79	600	20.5	7.3	11.3	32.	212.	42.	279.	15.	164.
2/18/79	615	20.5	7.2	11.5	31.	214.	41.	280.	14.	164.
2/18/79	630	20.5	7.0	11.8	32.	218.	41.	281.	15.	165.
2/18/79	645	20.5	7.0	11.8	32.	222.	41.	286.	15.	168.
2/18/79	700	20.5	7.0	11.8	34.	225.	44.	290.	16.	170.
2/18/79	715	20.5	6.5	12.3	42.	226.	52.	281.	19.	165.
2/18/79	730	20.5	7.1	11.3	40.	230.	52.	298.	19.	175.
2/18/79	745	20.5	7.0	11.5	41.	230.	53.	296.	19.	174.
2/18/79	800	20.5	7.1	11.5	42.	230.	54.	298.	19.	175.
2/18/79	815	20.5	7.2	11.3	38.	230.	50.	301.	18.	176.
2/18/79	830	20.5	7.0	11.5	32.	230.	41.	296.	15.	174.
2/18/79	845	20.5	6.9	11.8	32.	226.	41.	289.	15.	170.
2/18/79	900	20.5	6.9	11.8	32.	220.	41.	281.	15.	165.
2/18/79	915	20.5	7.0	11.5	32.	210.	41.	270.	15.	159.
2/18/79	930	20.5	7.0	11.5	32.	210.	41.	270.	15.	159.
2/18/79	945	20.5	7.0	11.5	32.	210.	41.	270.	15.	159.
2/18/79	1000	20.5	7.0	11.8	39.	210.	50.	270.	18.	159.
2/18/79	1015	20.5	7.0	11.8	34.	210.	44.	270.	16.	159.
2/18/79	1030	20.5	6.9	11.8	39.	204.	50.	261.	18.	153.
2/18/79	1045	20.5	7.0	11.5	50.	218.	64.	281.	23.	165.
2/18/79	1100	20.5	6.5	12.1	46.	221.	57.	275.	20.	161.
2/18/79	1115	20.5	6.7	12.1	49.	221.	62.	279.	22.	164.
2/18/79	1130	20.5	6.8	11.8	50.	220.	63.	279.	23.	164.
2/18/79	1145	20.5	7.4	11.3	48.	220.	64.	292.	23.	171.
2/18/79	1200	19.0	8.5	10.0	36.	231.	52.	333.	19.	196.

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**                                        15 MIN. DATA                                         **
**                                  DRY STACK GAS CONCENTRATION                                **
**                                                                                             **
**                                O2      CO2      CO       NO       CO       NO      CO      NO   **
**                       LOAD    VOL%    VOL%     PPMV     PPMV     PPMV     PPMV    NG/J    NG/J  **
**    DATE      TIME     MWTH    MEAS    MEAS     MEAS     MEAS     3%O2     3%O2               **
**************************************************************************************************
** 2/18/79      1215     19.0     7.5    10.8      35.      234.      47.     313.     17.    184.  **
** 2/18/79      1230     19.0     7.0    11.5      32.      231.      41.     297.     15.    175.  **
** 2/18/79      1245     19.0     6.5    12.3      32.      230.      40.     286.     14.    168.  **
** 2/18/79      1300     19.6     6.6    11.8      50.      224.      63.     280.     22.    165.  **
** 2/18/79      1315     19.6     8.0    10.8      50.      210.      69.     291.     25.    171.  **
** 2/18/79      1330     19.6    -1.0      .0      -1.       -1.      -1.      -1.     -1.     -1.  **
** 2/18/79      1345     19.6    -1.0      .0      -1.       -1.      -1.      -1.     -1.     -1.  **
** 2/18/79      1400     22.9     8.2    10.5      40.      210.      56.     296.     20.    174.  **
** 2/18/79      1415     22.9     8.0    10.8      42.      210.      58.     291.     21.    171.  **
** 2/18/79      1430     22.9     8.5    10.0      44.      210.      64.     303.     23.    178.  **
** 2/18/79      1445     22.9     7.0    11.3      44.      202.      57.     260.     20.    153.  **
** 2/18/79      1500     20.5     6.5    11.8      44.      207.      55.     257.     20.    151.  **
** 2/18/79      1515     20.5     6.0    11.8     200.      192.     240.     231.     86.    135.  **
** 2/18/79      1530     20.5     5.6    13.2     200.      200.     234.     234.     84.    137.  **
** 2/18/79      1545     20.5     6.0    13.2     100.      200.     120.     240.     43.    141.  **
** 2/18/79      1600     19.9     5.7    12.9      50.      211.      59.     248.     21.    146.  **
** 2/18/79      1615     19.9     5.8    12.6      50.      212.      59.     251.     21.    148.  **
** 2/18/79      1630     19.9     6.0    12.6      50.      212.      60.     255.     21.    150.  **
** 2/18/79      1645     19.9     6.0    12.6      45.      220.      54.     264.     19.    155.  **
** 2/18/79      1700     19.9     6.1    12.3      45.      226.      54.     273.     19.    160.  **
** 2/18/79      1715     19.9     7.0    11.8      32.      230.      41.     296.     15.    174.  **
** 2/18/79      1730     19.9     7.3    11.3      32.      235.      42.     309.     15.    182.  **
** 2/18/79      1745     19.9     6.9    11.3      32.      223.      41.     285.     15.    167.  **
** 2/18/79      1800     19.9     6.2    11.8      34.      226.      41.     275.     15.    162.  **
** 2/18/79      1815     19.9     6.2    12.1      40.      210.      49.     256.     17.    150.  **
** 2/18/79      1830     19.9     6.1    12.1      40.      210.      48.     254.     17.    149.  **
** 2/18/79      1845     19.9     6.2    12.3      38.      202.      46.     246.     17.    144.  **
** 2/18/79      1900     18.8     6.2    12.3      40.      202.      49.     246.     17.    144.  **
** 2/18/79      1915     18.8     6.2    12.1      35.      205.      43.     250.     15.    147.  **
** 2/18/79      1930     18.8     6.0    12.3      50.      210.      60.     252.     21.    148.  **
** 2/18/79      1945     18.8     6.8    11.8      40.      200.      51.     254.     18.    149.  **
** 2/18/79      2000     18.5     7.5    11.3      36.      210.      48.     281.     17.    165.  **
** 2/18/79      2015     18.5     7.0    11.3      38.      210.      49.     270.     17.    159.  **
** 2/18/79      2030     18.5     7.0    11.3      39.      215.      50.     277.     18.    163.  **
** 2/18/79      2045     18.5     6.8    11.3      40.      220.      51.     279.     18.    164.  **
** 2/18/79      2100     17.6     6.5    11.5      40.      230.      50.     286.     18.    168.  **
** 2/18/79      2115     17.6     6.5    11.5      38.      235.      47.     292.     17.    172.  **
** 2/18/79      2130     17.6     6.4    11.5      37.      228.      46.     281.     16.    165.  **
** 2/18/79      2145     17.6     6.7    11.3      38.      228.      48.     287.     17.    169.  **
** 2/18/79      2200     20.5     6.9    11.3      38.      230.      49.     294.     17.    173.  **
** 2/18/79      2215     20.5     6.7    11.5      38.      210.      48.     265.     17.    155.  **
** 2/18/79      2230     20.5     6.8    11.5      37.      200.      47.     254.     17.    149.  **
** 2/18/79      2245     20.5     7.5    11.0      45.      212.      60.     283.     21.    166.  **
** 2/18/79      2300     19.9     7.4    11.0      42.      205.      56.     272.     20.    160.  **
** 2/18/79      2315     19.9     6.0    12.1     100.      200.     120.     240.     43.    141.  **
** 2/18/79      2330     19.9     5.2    13.5     120.      202.     137.     230.     49.    135.  **
** 2/18/79      2345     19.9     4.7    13.8     120.      210.     133.     232.     47.    136.  **
** 2/18/79      2400     21.1     5.9    13.5     100.      215.     119.     257.     43.    151.  **
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15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
2/19/79	15	21.1	5.6	12.6	75.	218.	88.	255.	31.	150.
2/19/79	30	21.1	5.6	12.6	70.	210.	82.	246.	29.	144.
2/19/79	45	21.1	6.0	12.6	65.	200.	78.	240.	28.	141.
2/19/79	100	22.0	6.7	12.1	60.	210.	76.	265.	27.	155.
2/19/79	115	22.0	6.3	11.5	60.	220.	74.	270.	26.	158.
2/19/79	130	22.0	6.0	11.8	70.	228.	84.	274.	30.	161.
2/19/79	145	22.0	5.4	12.1	75.	230.	87.	266.	31.	156.
2/19/79	200	22.0	5.1	12.6	75.	225.	85.	255.	30.	150.
2/19/79	215	22.0	5.3	12.6	75.	232.	86.	266.	31.	156.
2/19/79	230	22.0	4.8	12.9	50.	222.	56.	247.	20.	145.
2/19/79	245	22.0	4.7	13.5	46.	212.	51.	234.	18.	138.
2/19/79	300	22.9	5.0	13.2	45.	208.	51.	234.	18.	137.
2/19/79	315	22.9	4.7	13.5	75.	200.	83.	221.	30.	130.
2/19/79	330	22.9	4.8	13.5	65.	200.	72.	222.	26.	131.
2/19/79	345	22.9	4.8	13.5	75.	208.	83.	231.	30.	136.
2/19/79	400	22.0	4.8	13.5	50.	210.	56.	233.	20.	137.
2/19/79	415	22.0	4.4	13.2	65.	215.	71.	233.	25.	137.
2/19/79	430	22.0	4.4	13.5	59.	221.	64.	240.	23.	141.
2/19/79	445	22.0	4.3	13.5	65.	220.	70.	237.	25.	139.
2/19/79	500	22.3	4.0	13.8	90.	220.	95.	233.	34.	137.
2/19/79	515	22.3	4.0	14.1	100.	226.	106.	239.	38.	141.
2/19/79	530	22.3	5.1	13.5	90.	220.	102.	249.	36.	146.
2/19/79	545	22.3	5.3	12.9	90.	215.	103.	247.	37.	145.
2/19/79	600	22.0	4.9	12.9	50.	222.	56.	248.	20.	146.
2/19/79	615	22.0	4.7	13.8	40.	218.	44.	241.	16.	141.
2/19/79	630	22.0	4.7	13.5	50.	212.	55.	234.	20.	138.
2/19/79	645	22.0	4.8	13.2	65.	214.	72.	238.	26.	140.
2/19/79	700	21.1	4.7	13.2	70.	211.	77.	233.	28.	137.
2/19/79	715	21.1	4.7	13.5	65.	210.	72.	232.	26.	136.
2/19/79	730	21.1	4.9	13.2	65.	208.	73.	233.	26.	137.
2/19/79	745	21.1	5.0	13.2	69.	205.	78.	231.	28.	136.
2/19/79	800	20.8	5.3	13.2	60.	206.	69.	236.	25.	139.
2/19/79	815	20.8	5.5	12.9	50.	210.	58.	244.	21.	143.
2/19/79	830	20.8	5.5	12.6	50.	240.	58.	279.	21.	164.
2/19/79	845	20.8	6.1	12.6	50.	239.	60.	289.	22.	170.
2/19/79	900	20.8	6.5	12.1	38.	238.	47.	296.	17.	174.
2/19/79	915	20.8	6.9	11.5	38.	231.	49.	295.	17.	173.
2/19/79	930	20.8	7.0	11.3	38.	228.	49.	294.	17.	172.
2/19/79	945	20.8	6.8	11.0	39.	212.	50.	269.	18.	158.
2/19/79	1000	20.5	6.0	12.1	45.	216.	54.	259.	19.	152.
2/19/79	1015	20.5	6.0	12.1	50.	220.	60.	264.	21.	155.
2/19/79	1030	20.5	6.3	12.1	46.	221.	56.	271.	20.	159.
2/19/79	1045	20.5	6.3	12.1	50.	220.	61.	270.	22.	158.
2/19/79	1100	20.5	6.3	11.8	48.	215.	59.	264.	21.	155.
2/19/79	1115	20.5	7.0	11.5	45.	230.	58.	296.	21.	174.
2/19/79	1130	20.5	7.0	11.0	38.	231.	49.	297.	17.	175.
2/19/79	1145	20.5	6.6	11.5	38.	238.	48.	298.	17.	175.
2/19/79	1200	20.5	6.5	11.3	35.	230.	44.	286.	16.	168.

15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
2/19/79	1215	20.5	6.6	11.3	35.	230.	44.	288.	16.	169.
2/19/79	1230	20.5	6.8	11.0	36.	228.	46.	289.	16.	170.
2/19/79	1245	20.5	6.4	11.3	38.	220.	47.	272.	17.	159.
2/19/79	1300	20.8	6.3	11.3	38.	212.	47.	260.	17.	153.
2/19/79	1315	20.8	6.5	11.3	50.	215.	62.	267.	22.	157.
2/19/79	1330	20.8	6.3	11.5	50.	221.	61.	271.	22.	159.
2/19/79	1345	20.8	6.3	11.5	50.	220.	61.	270.	22.	158.
2/19/79	1400	20.5	6.3	11.5	42.	238.	51.	292.	18.	171.
2/19/79	1415	20.5	6.2	11.5	41.	240.	50.	292.	18.	172.
2/19/79	1430	20.5	6.0	11.3	42.	240.	50.	288.	18.	169.
2/19/79	1445	20.5	6.0	11.5	50.	240.	60.	288.	21.	169.
2/19/79	1500	20.5	6.0	11.8	48.	245.	58.	294.	21.	173.
2/19/79	1515	20.5	6.5	11.5	42.	245.	52.	305.	19.	179.
2/19/79	1530	20.5	6.7	11.3	40.	250.	50.	315.	18.	185.
2/19/79	1545	20.5	6.7	11.0	42.	242.	53.	305.	19.	179.
2/19/79	1600	20.5	6.8	10.8	40.	243.	51.	308.	18.	181.
2/19/79	1615	20.5	6.9	10.8	40.	240.	51.	307.	18.	180.
2/19/79	1630	20.5	6.9	10.8	40.	241.	51.	308.	18.	181.
2/19/79	1645	20.5	6.1	11.3	40.	245.	48.	296.	17.	174.
2/19/79	1700	20.5	6.0	11.5	40.	235.	48.	282.	17.	166.
2/19/79	1715	20.5	6.2	11.3	40.	235.	49.	286.	17.	168.
2/19/79	1730	20.5	6.2	11.5	42.	220.	51.	268.	18.	157.
2/19/79	1745	20.5	8.0	11.0	42.	220.	58.	305.	21.	179.
2/19/79	1800	21.1	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
2/19/79	1815	21.1	7.4	11.3	42.	225.	56.	298.	20.	175.
2/19/79	1830	21.1	7.5	11.3	40.	228.	53.	305.	19.	179.
2/19/79	1845	21.1	7.5	11.3	41.	210.	55.	281.	20.	165.
2/19/79	1900	21.1	7.6	11.3	40.	210.	54.	283.	19.	166.
2/19/79	1915	21.1	6.3	11.5	41.	211.	50.	259.	18.	152.
2/19/79	1930	21.1	6.0	12.1	44.	216.	53.	259.	19.	152.
2/19/79	1945	21.1	5.9	12.6	45.	220.	54.	263.	19.	154.
2/19/79	2000	21.1	6.0	12.6	50.	221.	60.	265.	21.	156.
2/19/79	2015	21.1	6.0	12.9	55.	227.	66.	273.	24.	160.
2/19/79	2030	21.1	6.0	12.9	50.	228.	60.	274.	21.	161.
2/19/79	2045	21.1	6.3	12.9	50.	226.	61.	277.	22.	163.
2/19/79	2100	21.1	6.5	12.6	48.	215.	60.	267.	21.	157.
2/19/79	2115	21.1	6.3	12.6	42.	209.	51.	256.	18.	150.
2/19/79	2130	21.1	6.1	12.3	42.	198.	51.	239.	18.	141.
2/19/79	2145	21.1	6.3	12.6	42.	194.	51.	238.	18.	140.
2/19/79	2200	20.5	6.8	12.1	45.	194.	57.	246.	20.	145.
2/19/79	2215	20.5	6.6	12.3	45.	194.	56.	243.	20.	143.
2/19/79	2230	20.5	6.5	12.3	45.	199.	56.	247.	20.	145.
2/19/79	2245	20.5	6.5	12.3	45.	200.	56.	249.	20.	146.
2/19/79	2300	22.0	6.5	12.3	44.	210.	55.	261.	20.	153.
2/19/79	2315	22.0	6.3	12.6	46.	215.	56.	264.	20.	155.
2/19/79	2330	22.0	6.6	12.3	44.	217.	55.	272.	20.	159.
2/19/79	2345	22.0	6.1	12.6	52.	212.	63.	256.	22.	151.
2/19/79	2400	22.0	6.8	12.3	54.	212.	69.	269.	24.	158.

15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
2/20/79	15	22.0	7.0	12.1	52.	212.	67.	273.	24.	160.
2/20/79	30	22.0	6.5	12.1	52.	214.	65.	266.	23.	156.
2/20/79	45	22.0	6.0	12.3	58.	210.	70.	252.	25.	148.
2/20/79	100	20.5	6.0	12.9	60.	210.	72.	252.	26.	148.
2/20/79	115	20.5	6.3	12.6	46.	205.	56.	251.	20.	148.
2/20/79	130	20.5	6.4	12.6	42.	210.	52.	259.	19.	152.
2/20/79	145	20.5	6.6	12.1	44.	210.	55.	263.	20.	154.
2/20/79	200	20.5	6.5	12.3	42.	212.	52.	264.	19.	155.
2/20/79	215	20.5	6.5	12.3	42.	214.	52.	266.	19.	156.
2/20/79	230	20.5	6.5	12.3	45.	216.	56.	268.	20.	158.
2/20/79	245	20.5	6.0	12.9	45.	215.	54.	258.	19.	152.
2/20/79	300	20.8	6.2	12.6	45.	212.	55.	258.	20.	152.
2/20/79	315	20.8	6.5	12.3	45.	212.	56.	264.	20.	155.
2/20/79	330	20.8	6.4	12.3	50.	205.	62.	253.	22.	149.
2/20/79	345	20.8	6.5	12.3	50.	210.	62.	261.	22.	153.
2/20/79	400	20.5	6.7	12.1	55.	221.	69.	279.	25.	164.
2/20/79	415	20.5	6.0	12.9	60.	226.	72.	272.	26.	159.
2/20/79	430	20.5	5.9	12.9	75.	225.	89.	268.	32.	158.
2/20/79	445	20.5	6.1	12.6	60.	230.	73.	278.	26.	163.
2/20/79	500	21.4	6.6	12.3	55.	231.	69.	289.	25.	170.
2/20/79	515	21.4	7.0	11.8	44.	231.	57.	297.	20.	175.
2/20/79	530	21.4	7.0	11.8	36.	236.	46.	304.	17.	178.
2/20/79	545	21.4	6.9	12.1	32.	230.	41.	294.	15.	173.
2/20/79	600	20.5	6.8	12.1	34.	221.	43.	281.	15.	165.
2/20/79	615	20.5	6.5	12.3	34.	220.	42.	273.	15.	161.
2/20/79	630	20.5	6.9	12.1	32.	211.	41.	270.	15.	158.
2/20/79	645	20.5	6.5	12.3	40.	202.	50.	251.	18.	147.
2/20/79	700	20.8	7.0	12.1	80.	200.	103.	258.	37.	151.
2/20/79	715	20.8	7.5	11.5	80.	196.	107.	262.	38.	154.
2/20/79	730	20.8	6.6	12.1	100.	200.	125.	250.	45.	147.
2/20/79	745	20.8	7.0	11.5	100.	205.	129.	264.	46.	155.
2/20/79	800	20.5	6.7	12.1	70.	205.	88.	258.	32.	152.
2/20/79	815	20.5	6.7	12.1	65.	210.	82.	265.	29.	155.
2/20/79	830	20.5	6.5	12.1	60.	220.	75.	273.	27.	161.
2/20/79	845	20.5	6.5	12.3	50.	222.	62.	276.	22.	162.
2/20/79	900	20.8	6.6	12.3	48.	225.	60.	282.	21.	165.
2/20/79	915	20.8	6.8	12.1	40.	226.	51.	287.	18.	168.
2/20/79	930	20.8	7.5	11.3	42.	232.	56.	310.	20.	182.
2/20/79	945	20.8	7.3	11.5	40.	240.	53.	316.	19.	185.
2/20/79	1000	20.5	7.2	11.8	40.	238.	52.	311.	19.	183.
2/20/79	1015	20.5	7.0	11.8	40.	242.	52.	312.	18.	183.
2/20/79	1030	20.5	7.0	11.8	36.	240.	46.	309.	17.	181.
2/20/79	1045	20.5	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
2/20/79	1100	20.8	6.1	12.6	80.	229.	97.	277.	35.	163.
2/20/79	1115	20.8	6.0	12.6	80.	228.	96.	274.	34.	161.
2/20/79	1130	20.8	5.8	12.9	60.	230.	71.	273.	25.	160.
2/20/79	1145	20.8	6.0	12.6	70.	220.	84.	264.	30.	155.
2/20/79	1200	22.0	6.9	12.1	60.	230.	77.	294.	27.	173.

15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
2/20/79	1215	22.0	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
2/20/79	1230	22.0	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
2/20/79	1245	22.0	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
2/20/79	1300	22.0	6.3	12.3	70.	232.	86.	284.	31.	167.
2/20/79	1315	22.0	6.3	12.3	50.	238.	61.	292.	22.	171.
2/20/79	1330	22.0	6.5	11.5	42.	232.	52.	288.	19.	169.
2/20/79	1345	22.0	6.8	11.5	40.	232.	51.	295.	18.	173.
2/20/79	1400	21.1	6.7	11.8	50.	230.	63.	290.	23.	170.
2/20/79	1415	21.1	6.5	11.8	60.	226.	75.	281.	27.	165.
2/20/79	1430	21.1	6.4	12.1	60.	225.	74.	278.	26.	163.
2/20/79	1445	21.1	6.0	12.6	50.	225.	60.	270.	21.	159.
2/20/79	1500	20.5	6.5	11.5	42.	230.	52.	286.	19.	168.
2/20/79	1515	20.5	6.8	11.3	40.	235.	51.	298.	18.	175.
2/20/79	1530	20.5	6.7	11.5	42.	220.	53.	277.	19.	163.
2/20/79	1545	20.5	6.6	11.5	42.	230.	53.	288.	19.	169.
2/20/79	1600	20.5	6.5	11.3	42.	230.	52.	286.	19.	168.
2/20/79	1615	20.5	6.5	11.3	42.	224.	52.	278.	19.	163.
2/20/79	1630	20.5	6.5	11.0	40.	218.	50.	271.	18.	159.
2/20/79	1645	20.5	7.8	10.8	40.	210.	55.	287.	20.	168.
2/20/79	1700	20.5	7.7	10.8	40.	212.	54.	287.	19.	169.
2/20/79	1715	20.5	7.0	11.5	42.	218.	54.	281.	19.	165.
2/20/79	1730	20.5	6.8	11.8	42.	220.	53.	279.	19.	164.
2/20/79	1745	20.5	6.8	11.8	42.	220.	53.	279.	19.	164.
2/20/79	1800	20.5	6.7	12.1	42.	216.	53.	272.	19.	160.
2/20/79	1815	20.5	6.5	12.3	42.	228.	52.	283.	19.	166.
2/20/79	1830	20.5	6.3	12.6	50.	220.	61.	270.	22.	158.
2/20/79	1845	20.5	6.2	12.6	75.	215.	91.	262.	33.	154.
2/20/79	1900	21.1	6.2	12.6	65.	212.	79.	258.	28.	152.
2/20/79	1915	21.1	6.0	12.6	65.	208.	78.	250.	28.	147.
2/20/79	1930	21.1	6.3	12.6	70.	200.	86.	245.	31.	144.
2/20/79	1945	21.1	6.6	12.1	100.	185.	125.	232.	45.	136.
2/20/79	2000	20.5	7.1	11.8	80.	190.	104.	246.	37.	145.
2/20/79	2015	20.5	7.1	11.8	65.	180.	84.	233.	30.	137.
2/20/79	2030	20.5	9.0	10.5	40.	195.	60.	293.	22.	172.
2/20/79	2045	20.5	9.0	10.0	40.	190.	60.	286.	22.	168.
2/20/79	2100	20.2	7.0	12.1	100.	210.	129.	270.	46.	159.
2/20/79	2115	20.2	8.2	11.0	50.	210.	70.	296.	25.	174.
2/20/79	2130	20.2	8.1	11.0	44.	211.	62.	295.	22.	173.
2/20/79	2145	20.2	8.0	11.0	42.	210.	58.	291.	21.	171.
2/20/79	2200	19.6	8.0	11.0	42.	214.	58.	297.	21.	174.
2/20/79	2215	19.6	8.0	11.0	42.	210.	58.	291.	21.	171.
2/20/79	2230	19.6	7.5	11.8	50.	210.	67.	281.	24.	165.
2/20/79	2245	19.6	8.0	11.3	40.	210.	56.	291.	20.	171.
2/20/79	2300	19.9	8.0	11.3	40.	220.	56.	305.	20.	179.
2/20/79	2315	19.9	7.4	11.8	42.	210.	56.	278.	20.	163.
2/20/79	2330	19.9	8.0	11.0	40.	211.	56.	293.	20.	172.
2/20/79	2345	19.9	8.0	11.0	40.	211.	56.	293.	20.	172.
2/20/79	2400	20.2	7.9	11.3	39.	210.	54.	289.	19.	170.

15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
2/21/79	15	20.2	7.8	11.3	40.	200.	55.	273.	20.	160.
2/21/79	30	20.2	7.5	11.5	42.	195.	56.	260.	20.	153.
2/21/79	45	20.2	7.6	11.5	42.	200.	57.	269.	20.	158.
2/21/79	100	20.5	7.5	11.3	40.	202.	53.	270.	19.	158.
2/21/79	115	20.5	7.5	11.5	40.	202.	53.	270.	19.	158.
2/21/79	130	20.5	7.9	11.0	40.	200.	55.	275.	20.	162.
2/21/79	145	20.5	7.6	11.3	40.	200.	54.	269.	19.	158.
2/21/79	200	20.5	7.4	11.5	39.	200.	52.	265.	18.	156.
2/21/79	215	20.5	7.4	11.8	39.	200.	52.	265.	18.	156.
2/21/79	230	20.5	7.4	11.8	40.	205.	53.	272.	19.	160.
2/21/79	245	20.5	8.0	11.0	34.	200.	47.	278.	17.	163.
2/21/79	300	17.6	8.3	10.5	34.	200.	48.	284.	17.	167.
2/21/79	315	17.6	7.5	11.3	32.	195.	43.	260.	15.	153.
2/21/79	330	17.6	7.5	11.5	36.	195.	48.	260.	17.	153.
2/21/79	345	17.6	7.5	11.3	32.	196.	43.	262.	15.	154.
2/21/79	400	14.6	8.5	10.8	32.	190.	46.	274.	17.	161.
2/21/79	415	14.6	8.5	10.5	38.	195.	55.	281.	20.	165.
2/21/79	430	14.6	9.5	9.6	35.	190.	55.	298.	20.	175.
2/21/79	445	14.6	9.5	9.6	34.	186.	53.	292.	19.	171.
2/21/79	500	14.6	9.5	9.6	35.	180.	55.	283.	20.	166.
2/21/79	515	14.6	9.6	9.6	35.	180.	55.	285.	20.	167.
2/21/79	530	14.6	9.6	9.3	34.	180.	54.	285.	19.	167.
2/21/79	545	14.6	7.6	9.3	35.	180.	55.	285.	20.	167.
2/21/79	600	14.6	9.8	9.1	36.	182.	58.	293.	21.	172.
2/21/79	615	14.6	9.8	9.1	34.	180.	55.	290.	20.	170.
2/21/79	630	14.6	9.0	9.8	33.	184.	50.	277.	18.	163.
2/21/79	645	14.6	8.7	10.5	32.	185.	47.	271.	17.	159.
2/21/79	700	14.6	8.7	10.5	34.	180.	50.	264.	18.	155.
2/21/79	715	14.6	8.5	10.5	34.	184.	49.	266.	18.	156.
2/21/79	730	14.6	8.5	10.5	34.	185.	49.	267.	18.	157.
2/21/79	745	14.6	8.0	10.8	34.	182.	47.	253.	17.	148.
2/21/79	800	15.2	8.0	11.0	40.	182.	56.	253.	20.	148.
2/21/79	815	15.2	8.0	11.0	36.	180.	50.	250.	18.	147.
2/21/79	830	15.2	8.0	11.0	35.	182.	49.	253.	17.	148.
2/21/79	845	15.2	7.5	11.5	36.	188.	48.	251.	17.	147.
2/21/79	900	17.6	7.2	11.8	32.	195.	42.	255.	15.	150.
2/21/79	915	17.6	9.1	10.3	32.	210.	49.	319.	17.	187.
2/21/79	930	17.6	9.0	10.0	34.	210.	51.	316.	18.	185.
2/21/79	945	17.6	7.5	11.3	45.	208.	60.	278.	21.	163.
2/21/79	1000	19.0	6.3	12.6	50.	200.	61.	245.	22.	144.
2/21/79	1015	19.0	7.0	12.1	42.	190.	54.	245.	19.	144.
2/21/79	1030	19.0	7.4	11.8	50.	200.	66.	265.	24.	156.
2/21/79	1045	19.0	8.2	11.0	46.	200.	65.	282.	23.	166.
2/21/79	1100	16.1	7.9	11.0	42.	200.	58.	275.	21.	162.
2/21/79	1115	16.1	10.0	9.1	42.	210.	69.	345.	25.	202.
2/21/79	1130	16.1	10.0	8.9	42.	220.	69.	361.	25.	212.
2/21/79	1145	16.1	10.0	9.1	42.	210.	69.	345.	25.	202.
2/21/79	1200	17.6	7.0	11.5	50.	210.	64.	270.	23.	159.

15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
2/21/79	1215	17.6	7.0	11.5	40.	200.	52.	258.	18.	151.
2/21/79	1230	17.6	7.5	11.5	50.	210.	67.	281.	24.	165.
2/21/79	1245	17.6	7.6	11.3	40.	215.	54.	289.	19.	170.
2/21/79	1300	19.0	7.3	11.3	38.	220.	50.	290.	18.	170.
2/21/79	1315	19.0	7.2	11.5	38.	221.	50.	289.	18.	170.
2/21/79	1330	19.0	7.0	11.8	38.	222.	49.	286.	17.	168.
2/21/79	1345	19.0	7.1	11.8	38.	224.	49.	291.	18.	171.
2/21/79	1400	17.6	7.3	11.5	40.	220.	53.	290.	19.	170.
2/21/79	1415	17.6	7.7	11.3	35.	215.	47.	292.	17.	171.
2/21/79	1430	17.6	8.5	11.0	38.	220.	55.	318.	20.	186.
2/21/79	1445	17.6	8.0	11.0	38.	214.	53.	297.	19.	174.
2/21/79	1500	17.6	7.9	11.0	38.	210.	52.	289.	19.	170.
2/21/79	1515	17.6	7.8	11.0	36.	205.	49.	280.	18.	164.
2/21/79	1530	17.6	7.9	10.8	35.	210.	48.	289.	17.	170.
2/21/79	1545	17.6	7.9	11.0	35.	214.	48.	295.	17.	173.
2/21/79	1600	17.6	8.0	11.0	35.	220.	49.	305.	17.	179.
2/21/79	1615	17.6	8.0	11.0	35.	235.	49.	326.	17.	191.
2/21/79	1630	17.6	8.0	11.0	33.	235.	46.	326.	16.	191.
2/21/79	1645	17.6	8.0	11.0	33.	225.	46.	312.	16.	183.
2/21/79	1700	17.6	7.6	11.0	34.	220.	46.	296.	16.	174.
2/21/79	1715	17.6	7.5	11.3	34.	212.	45.	283.	16.	166.
2/21/79	1730	17.6	7.5	11.3	33.	219.	44.	293.	16.	172.
2/21/79	1745	17.6	7.6	11.0	33.	221.	44.	297.	16.	175.
2/21/79	1800	17.6	7.5	11.3	32.	230.	43.	307.	15.	180.
2/21/79	1815	17.6	7.5	11.3	32.	222.	43.	297.	15.	174.
2/21/79	1830	17.6	7.5	11.3	32.	216.	43.	289.	15.	169.
2/21/79	1845	17.6	7.9	11.3	32.	210.	44.	289.	16.	170.
2/21/79	1900	17.6	7.5	11.0	31.	200.	41.	267.	15.	157.
2/21/79	1915	17.6	7.9	11.0	40.	192.	55.	264.	20.	155.
2/21/79	1930	17.6	8.0	10.8	34.	184.	47.	255.	17.	150.
2/21/79	1945	17.6	8.0	10.8	35.	190.	49.	264.	17.	155.
2/21/79	2000	17.6	7.5	11.0	38.	190.	51.	254.	18.	149.
2/21/79	2015	17.6	8.7	10.3	39.	190.	57.	279.	20.	164.
2/21/79	2030	17.6	8.7	10.5	38.	165.	56.	242.	20.	142.
2/21/79	2045	17.6	8.7	10.3	38.	190.	56.	279.	20.	164.
2/21/79	2100	22.0	10.0	9.1	50.	210.	82.	345.	29.	202.
2/21/79	2115	22.0	5.6	12.9	100.	190.	117.	222.	42.	131.
2/21/79	2130	22.0	6.5	12.9	80.	220.	99.	273.	36.	161.
2/21/79	2145	22.0	6.0	13.2	70.	230.	84.	276.	30.	162.
2/21/79	2200	20.5	6.3	12.6	60.	230.	74.	282.	26.	166.
2/21/79	2215	20.5	6.0	13.2	50.	226.	60.	272.	21.	159.
2/21/79	2230	20.5	6.6	12.6	42.	228.	53.	285.	19.	168.
2/21/79	2245	20.5	6.6	12.6	42.	220.	53.	275.	19.	162.
2/21/79	2300	20.5	6.6	12.3	42.	218.	53.	273.	19.	160.
2/21/79	2315	20.5	6.7	12.3	38.	214.	48.	270.	17.	158.
2/21/79	2330	20.5	6.7	12.3	38.	210.	48.	265.	17.	155.
2/21/79	2345	20.5	6.5	12.6	38.	210.	47.	261.	17.	153.
2/21/79	2400	20.5	6.7	12.3	40.	200.	50.	252.	18.	148.

15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
2/22/79	15	20.5	6.7	12.3	40.	200.	50.	252.	18.	148.
2/22/79	30	20.5	6.6	12.3	48.	200.	60.	250.	21.	147.
2/22/79	45	20.5	6.5	12.3	60.	196.	75.	244.	27.	143.
2/22/79	100	20.5	6.5	12.3	50.	192.	62.	239.	22.	140.
2/22/79	115	20.5	6.7	12.3	50.	194.	63.	245.	23.	144.
2/22/79	130	20.5	7.0	12.1	42.	196.	54.	252.	19.	148.
2/22/79	145	20.5	7.0	12.1	42.	190.	54.	245.	19.	144.
2/22/79	200	20.2	7.5	11.5	42.	186.	56.	248.	20.	146.
2/22/79	215	20.2	7.5	11.5	100.	180.	134.	240.	48.	141.
2/22/79	230	20.2	6.5	12.6	100.	184.	124.	229.	44.	134.
2/22/79	245	20.2	7.4	11.8	90.	175.	119.	232.	43.	136.
2/22/79	300	19.6	7.0	12.1	65.	166.	84.	214.	30.	126.
2/22/79	315	19.6	9.3	10.0	65.	160.	100.	247.	36.	145.
2/22/79	330	19.6	9.3	10.0	65.	163.	100.	252.	36.	148.
2/22/79	345	19.6	9.3	10.0	65.	165.	100.	255.	36.	149.
2/22/79	400	18.5	9.3	9.8	60.	168.	93.	259.	33.	152.
2/22/79	415	18.5	9.3	10.0	60.	165.	93.	255.	33.	149.
2/22/79	430	18.5	9.3	9.8	60.	165.	93.	255.	33.	149.
2/22/79	445	18.5	9.1	10.0	50.	160.	76.	243.	27.	143.
2/22/79	500	17.6	9.3	9.8	50.	160.	77.	247.	28.	145.
2/22/79	515	17.6	9.4	9.6	48.	160.	75.	249.	27.	146.
2/22/79	530	17.6	9.3	9.8	48.	158.	74.	244.	26.	143.
2/22/79	545	17.6	8.5	10.5	48.	156.	69.	225.	25.	132.
2/22/79	600	17.6	8.5	10.5	56.	152.	81.	219.	29.	129.
2/22/79	615	17.6	9.0	10.0	60.	160.	90.	241.	32.	141.
2/22/79	630	17.6	9.0	10.0	70.	165.	105.	248.	38.	146.
2/22/79	645	17.6	9.0	10.3	70.	180.	105.	271.	38.	159.
2/22/79	700	17.9	9.0	10.0	100.	185.	150.	278.	54.	163.
2/22/79	715	17.9	8.9	10.3	65.	170.	97.	254.	35.	149.
2/22/79	730	17.9	9.0	10.0	50.	200.	75.	301.	27.	177.
2/22/79	745	17.9	10.1	8.7	50.	210.	83.	348.	30.	204.
2/22/79	800	17.6	9.9	8.9	48.	215.	78.	350.	28.	205.
2/22/79	815	17.6	9.8	9.3	42.	210.	68.	339.	24.	199.
2/22/79	830	17.6	9.1	10.0	34.	210.	52.	319.	18.	187.
2/22/79	845	17.6	7.5	11.3	32.	190.	43.	254.	15.	149.
2/22/79	900	17.6	7.8	11.3	40.	210.	55.	287.	20.	168.
2/22/79	915	17.6	7.7	11.3	40.	211.	54.	286.	19.	168.
2/22/79	930	17.6	7.8	11.3	40.	215.	55.	294.	20.	172.
2/22/79	945	17.6	8.5	10.8	32.	230.	46.	332.	17.	195.
2/22/79	1000	17.6	8.5	10.8	32.	218.	46.	315.	17.	185.
2/22/79	1015	17.6	8.4	10.8	31.	220.	44.	315.	16.	185.
2/22/79	1030	17.6	8.0	11.3	32.	226.	44.	314.	16.	184.
2/22/79	1045	17.6	7.9	11.5	60.	228.	83.	314.	30.	184.
2/22/79	1100	18.2	7.0	12.6	40.	222.	52.	286.	18.	168.
2/22/79	1115	18.2	7.5	11.5	32.	221.	43.	295.	15.	173.
2/22/79	1130	18.2	7.6	11.3	32.	221.	43.	297.	15.	175.
2/22/79	1145	18.2	5.3	13.5	32.	226.	37.	259.	13.	152.
2/22/79	1200	17.6	7.7	11.3	42.	220.	57.	298.	20.	175.

15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
2/22/79	1215	17.6	7.8	11.0	40.	220.	55.	301.	20.	176.
2/22/79	1230	17.6	7.9	11.0	30.	224.	41.	308.	15.	181.
2/22/79	1245	17.6	7.6	11.3	30.	220.	40.	296.	14.	178.
2/22/79	1300	17.6	7.6	11.3	30.	220.	40.	296.	14.	178.
2/22/79	1315	17.6	7.7	11.3	30.	220.	41.	298.	15.	175.
2/22/79	1330	17.6	6.3	12.6	40.	220.	49.	270.	18.	158.
2/22/79	1345	17.6	7.9	11.0	32.	230.	44.	317.	16.	186.
2/22/79	1400	17.9	7.0	11.8	32.	221.	41.	285.	15.	167.
2/22/79	1415	17.9	7.5	11.5	34.	230.	45.	307.	16.	180.
2/22/79	1430	17.9	7.3	11.8	32.	230.	42.	303.	15.	178.
2/22/79	1445	17.9	7.5	11.5	32.	225.	43.	301.	15.	176.
2/22/79	1500	17.9	7.1	11.8	34.	240.	44.	311.	16.	183.
2/22/79	1515	17.9	8.8	10.5	32.	228.	47.	337.	17.	198.
2/22/79	1530	17.9	8.6	10.5	34.	210.	49.	306.	18.	179.
2/22/79	1545	17.6	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
2/22/79	1600	17.6	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
2/22/79	1615	17.6	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
2/22/79	1630	17.6	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
2/22/79	1645	17.6	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.
2/22/79	1700	17.9	6.9	12.3	46.	208.	59.	266.	21.	156.
2/22/79	1715	17.9	6.7	12.3	45.	212.	57.	267.	20.	157.
2/22/79	1730	17.9	6.8	12.3	45.	220.	57.	279.	20.	164.
2/22/79	1745	17.9	7.0	12.1	45.	220.	58.	283.	21.	166.
2/22/79	1800	17.9	6.9	12.3	46.	220.	59.	281.	21.	165.
2/22/79	1815	17.9	6.5	12.6	45.	225.	56.	280.	20.	164.
2/22/79	1830	17.9	6.5	12.9	42.	221.	52.	275.	19.	161.
2/22/79	1845	17.9	6.7	12.3	42.	231.	53.	291.	19.	171.
2/22/79	1900	18.2	7.1	12.1	38.	228.	49.	296.	18.	174.
2/22/79	1915	18.2	7.4	11.8	40.	230.	53.	305.	19.	179.
2/22/79	1930	18.2	7.3	11.8	40.	220.	53.	290.	19.	170.
2/22/79	1945	18.2	7.5	11.5	40.	206.	53.	275.	19.	162.
2/22/79	2000	17.6	7.5	11.5	43.	212.	57.	283.	21.	166.
2/22/79	2015	17.6	7.6	11.3	46.	214.	62.	288.	22.	169.
2/22/79	2030	17.6	7.5	11.5	40.	210.	53.	281.	19.	165.
2/22/79	2045	17.6	7.5	11.5	40.	210.	53.	281.	19.	165.
2/22/79	2100	17.3	7.5	11.5	32.	210.	43.	281.	15.	165.
2/22/79	2115	17.3	7.6	11.3	32.	200.	43.	269.	15.	158.
2/22/79	2130	17.3	7.7	11.3	40.	202.	54.	274.	19.	161.
2/22/79	2145	17.3	7.6	11.3	40.	209.	54.	281.	19.	165.
2/22/79	2200	17.0	7.7	11.3	40.	205.	54.	278.	19.	163.
2/22/79	2215	17.0	7.6	11.3	40.	205.	54.	276.	19.	162.
2/22/79	2230	17.0	7.6	11.3	40.	205.	54.	276.	19.	162.
2/22/79	2245	17.0	7.9	11.0	38.	195.	52.	268.	19.	158.
2/22/79	2300	16.4	8.1	11.0	32.	200.	45.	280.	16.	164.
2/22/79	2315	16.4	8.0	11.0	33.	200.	46.	278.	16.	163.
2/22/79	2330	16.4	8.0	11.0	32.	200.	44.	278.	16.	163.
2/22/79	2345	16.4	8.0	11.0	32.	210.	44.	291.	16.	171.
2/22/79	2400	16.4	8.0	11.0	32.	217.	44.	301.	16.	177.

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**                                  15 MIN, DATA                                       **
**                           DRY STACK GAS CONCENTRATION                               **
**                                                                                     **
**                              O2      CO2     CO      NO      CO      NO      CO      NO    **
**                     LOAD    VOL%    VOL%    PPMV    PPMV    PPMV    PPMV    NG/J    NG/J   **
**    DATE     TIME    MWTH    MEAS    MEAS    MEAS    MEAS    3%O2    3%O2                   **
*****************************************************************************************
** 2/23/79      15     16.4     8.0    11.0     34.    218.     47.    302.     17.    178.   **
** 2/23/79      30     16.4     8.0    11.0     34.    220.     47.    305.     17.    179.   **
** 2/23/79      45     16.4     8.0    11.0     40.    212.     56.    294.     20.    173.   **
** 2/23/79     100     16.7     7.8    11.3     42.    210.     57.    287.     21.    168.   **
** 2/23/79     115     16.7     8.0    11.0     38.    210.     53.    291.     19.    171.   **
** 2/23/79     130     16.7     8.5    10.8     34.    200.     49.    289.     18.    170.   **
** 2/23/79     145     16.7     8.4    10.8     34.    195.     49.    279.     17.    164.   **
** 2/23/79     200     16.1     8.5    10.3     32.    182.     46.    263.     17.    154.   **
** 2/23/79     215     16.1     9.4     9.8     34.    184.     53.    286.     19.    168.   **
** 2/23/79     230     16.1     9.4    10.3     34.    185.     53.    288.     19.    169.   **
** 2/23/79     245     16.1     9.0    10.5     35.    185.     53.    278.     19.    163.   **
** 2/23/79     300     16.4     8.7    10.8     35.    190.     51.    279.     18.    164.   **
** 2/23/79     315     16.4     8.6    10.8     34.    195.     49.    284.     18.    167.   **
** 2/23/79     330     16.4     8.8    10.5     34.    200.     50.    296.     18.    174.   **
** 2/23/79     345     16.4     9.0    10.3     34.    200.     51.    301.     18.    177.   **
** 2/23/79     400     15.8     9.0    10.3     32.    195.     48.    293.     17.    172.   **
** 2/23/79     415     15.8     9.2    10.0     32.    195.     49.    298.     17.    175.   **
** 2/23/79     430     15.8     9.5     9.8     33.    200.     52.    314.     19.    184.   **
** 2/23/79     445     15.8     9.8     9.6     32.    195.     52.    314.     18.    185.   **
** 2/23/79     500     14.6     9.9     9.3     50.    195.     81.    317.     29.    186.   **
** 2/23/79     515     14.6    10.0     9.6     42.    200.     69.    320.     25.    193.   **
** 2/23/79     530     14.6    10.0     9.6     42.    200.     69.    328.     25.    193.   **
** 2/23/79     545     14.6     9.9     9.8     35.    199.     57.    324.     20.    190.   **
** 2/23/79     600     14.6     9.8     9.8     35.    199.     56.    321.     20.    188.   **
** 2/23/79     615     14.6     9.7     9.8     48.    198.     77.    316.     27.    186.   **
** 2/23/79     630     14.6     9.7     9.8     50.    200.     80.    320.     29.    188.   **
** 2/23/79     645     14.6     9.5    10.0     49.    195.     77.    306.     27.    180.   **
** 2/23/79     700     14.9     9.5     9.8     50.    198.     79.    311.     28.    183.   **
** 2/23/79     715     14.9     9.6     9.8     50.    194.     79.    307.     28.    180.   **
** 2/23/79     730     14.9     9.6     9.8     50.    192.     79.    304.     28.    179.   **
** 2/23/79     745     14.9     9.5     9.8     50.    191.     79.    300.     28.    176.   **
** 2/23/79     800     14.9     9.5    10.0     42.    192.     66.    301.     24.    177.   **
** 2/23/79     815     14.9     9.3    10.3     40.    192.     62.    296.     22.    174.   **
** 2/23/79     830     14.9     9.1    10.3     40.    205.     61.    311.     22.    183.   **
** 2/23/79     845     14.9     9.0    10.0     50.    210.     75.    316.     27.    185.   **
** 2/23/79     900     14.6    -1.0      .0     -1.     -1.     -1.     -1.     -1.     -1.   **
** 2/23/79     915     14.6    -1.0      .0     -1.     -1.     -1.     -1.     -1.     -1.   **
** 2/23/79     930     14.6    10.0    11.5     50.    210.     82.    345.     29.    202.   **
** 2/23/79     945     14.6     9.5    11.8     50.    210.     79.    330.     28.    198.   **
** 2/23/79    1000     14.9     9.2    12.1     46.    210.     71.    325.     25.    189.   **
** 2/23/79    1015     14.9     9.5     9.8     45.    210.     71.    330.     25.    198.   **
** 2/23/79    1030     14.9     9.5     9.8     45.    208.     71.    327.     25.    192.   **
** 2/23/79    1045     14.9     9.5     9.6     45.    205.     71.    322.     25.    189.   **
** 2/23/79    1100     14.6     9.8     9.3     50.    205.     81.    331.     29.    194.   **
** 2/23/79    1115     16.1    10.0     9.1     52.    200.     85.    328.     31.    193.   **
** 2/23/79    1130     16.1    10.0     9.1     52.    200.     85.    328.     31.    193.   **
** 2/23/79    1145     16.1    10.3     8.9     52.    198.     88.    334.     31.    196.   **
** 2/23/79    1200     14.6    10.3     8.9     56.    200.     95.    338.     34.    198.   **
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**                                       15 MIN. DATA                                             **
**                              DRY STACK GAS CONCENTRATION                                       **
**                                                                                                **
**                             O2      CO2     CO      NO      CO      NO      CO      NO         **
**                    LOAD     VOL%    VOL%    PPMV    PPMV    PPMV    PPMV    NG/J    NG/J       **
**   DATE      TIME   MWTH     MEAS    MEAS    MEAS    MEAS    3%O2    3%O2                       **
***************************************************************************************************
** 2/23/79     1215   14.6     10.5     8.7     55.    200.     95.    344.    34.    202.       **
** 2/23/79     1230   14.6     10.3     8.9     55.    198.     93.    334.    33.    196.       **
** 2/23/79     1245   14.6     10.3     8.9     55.    198.     93.    334.    33.    196.       **
** 2/23/79     1300   14.4     10.5     8.7     60.    195.    103.    336.    37.    197.       **
** 2/23/79     1315   14.4     10.3     8.7     60.    195.    101.    329.    36.    193.       **
** 2/23/79     1330   14.4     10.5     8.5     60.    195.    103.    336.    37.    197.       **
** 2/23/79     1345   14.4     10.8     8.5     58.    190.    103.    337.    37.    198.       **
** 2/23/79     1400   14.4     10.5     8.7     52.    185.     89.    318.    32.    187.       **
** 2/23/79     1415   14.4     10.8     8.5     50.    185.     89.    328.    32.    193.       **
** 2/23/79     1430   14.4     10.8     8.5     50.    190.     89.    337.    32.    198.       **
** 2/23/79     1445   14.4     10.8     8.5     52.    188.     92.    333.    33.    196.       **
** 2/23/79     1500   14.1     10.8     8.5     50.    189.     89.    335.    32.    197.       **
** 2/23/79     1515   14.1     11.0     8.5     51.    185.     92.    334.    33.    196.       **
** 2/23/79     1530   14.1     10.8     8.5     50.    195.     89.    346.    32.    203.       **
** 2/23/79     1545   14.1     11.0     8.3     50.    190.     90.    344.    32.    202.       **
** 2/23/79     1600   13.8     11.0     8.5     58.    190.    105.    344.    37.    202.       **
** 2/23/79     1615   13.8     10.8     8.5     55.    199.     97.    353.    35.    207.       **
** 2/23/79     1630   13.8     10.8     8.5     50.    190.     89.    337.    32.    198.       **
** 2/23/79     1645   13.8     -1.0      .0     -1.     -1.     -1.     -1.    -1.     -1.       **
** 2/23/79     1700   12.9     -1.0      .0     -1.     -1.     -1.     -1.    -1.     -1.       **
** 2/23/79     1715     .0       .0      .0      0.      0.      0.      0.     0.      0.       **
** 2/23/79     1730   12.9     -1.0      .0     -1.     -1.     -1.     -1.    -1.     -1.       **
** 2/23/79     1745   12.9     -1.0      .0     -1.     -1.     -1.     -1.    -1.     -1.       **
** 2/23/79     1800   12.3     10.3     9.6     42.    180.     71.    304.    25.    178.       **
** 2/23/79     1815   12.3     10.0     9.8     46.    175.     76.    287.    27.    169.       **
** 2/23/79     1830   12.3     10.3     9.3     48.    172.     81.    290.    29.    171.       **
** 2/23/79     1845   12.3     10.3     9.3     50.    170.     84.    287.    30.    169.       **
** 2/23/79     1900   12.3     10.5     9.1     50.    174.     86.    299.    31.    176.       **
** 2/23/79     1915   12.3     10.5     9.1     50.    168.     86.    289.    31.    170.       **
** 2/23/79     1930   12.3     10.3     9.3     50.    160.     84.    270.    30.    159.       **
** 2/23/79     1945   12.3     10.3     9.3     50.    160.     84.    270.    30.    159.       **
** 2/23/79     2000   12.3     10.0     9.3     50.    160.     82.    263.    29.    154.       **
** 2/23/79     2015   12.3     10.3     9.3     52.    162.     88.    274.    31.    161.       **
** 2/23/79     2030   12.3     10.0     9.6     52.    162.     85.    266.    31.    156.       **
** 2/23/79     2045   12.3     10.0     9.3     58.    160.     95.    263.    34.    154.       **
** 2/23/79     2100   12.3     10.0     9.6     50.    170.     82.    279.    29.    164.       **
** 2/23/79     2115   12.3     10.0     9.6     50.    170.     82.    279.    29.    164.       **
** 2/23/79     2130   12.3      9.5     9.8     50.    185.     79.    290.    28.    171.       **
** 2/23/79     2145   12.3      9.0    10.0     50.    190.     75.    286.    27.    168.       **
** 2/23/79     2200   14.6      8.5    10.5     40.    192.     58.    277.    21.    163.       **
** 2/23/79     2215   14.6      7.5    12.3     38.    190.     51.    254.    18.    149.       **
** 2/23/79     2230   14.6      8.3    11.8     34.    190.     51.    270.    18.    158.       **
** 2/23/79     2245   14.6      8.8    11.0     36.    195.     53.    288.    19.    169.       **
** 2/23/79     2300   14.4      8.8    11.0     36.    195.     53.    288.    19.    169.       **
** 2/23/79     2315   14.4      9.8    10.0     40.    190.     65.    306.    23.    180.       **
** 2/23/79     2330   14.4     10.0     9.8     40.    195.     66.    320.    23.    188.       **
** 2/23/79     2345   14.4     10.0     9.6     40.    195.     66.    320.    23.    188.       **
** 2/23/79     2400   14.6      9.8    10.0     40.    195.     65.    314.    23.    185.       **
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15 MIN. DATA
DRY STACK GAS CONCENTRATION

DATE	TIME	LOAD MWTH	O2 VOL% MEAS	CO2 VOL% MEAS	CO PPMV MEAS	NO PPMV MEAS	CO PPMV 3%O2	NO PPMV 3%O2	CO NG/J	NO NG/J
2/24/79	15	14.6	9.3	10.0	40.	195.	62.	301.	22.	177.
2/24/79	30	14.6	9.0	10.3	40.	190.	60.	286.	22.	168.
2/24/79	45	14.6	9.0	10.3	42.	186.	63.	280.	23.	164.
2/24/79	100	16.1	8.5	10.8	42.	190.	61.	278.	22.	161.
2/24/79	115	16.1	8.3	11.0	40.	190.	57.	270.	20.	158.
2/24/79	130	16.1	8.3	11.0	40.	192.	57.	273.	20.	160.
2/24/79	145	16.1	8.0	11.3	40.	190.	56.	264.	20.	155.
2/24/79	200	16.1	8.3	11.0	40.	190.	57.	270.	20.	158.
2/24/79	215	16.1	8.3	11.0	40.	190.	57.	270.	20.	158.
2/24/79	230	16.1	8.0	11.3	43.	185.	60.	257.	21.	151.
2/24/79	245	16.1	8.3	11.0	44.	190.	63.	270.	22.	158.
2/24/79	300	17.0	8.0	11.3	50.	185.	69.	257.	25.	151.
2/24/79	315	17.0	8.0	11.3	50.	184.	69.	255.	25.	150.
2/24/79	330	17.0	8.0	11.3	48.	180.	67.	250.	24.	147.
2/24/79	345	17.0	7.8	11.3	49.	181.	67.	247.	24.	145.
2/24/79	400	17.3	8.0	11.3	49.	180.	68.	250.	24.	147.
2/24/79	415	17.3	7.7	11.5	50.	180.	68.	244.	24.	143.
2/24/79	430	17.3	8.0	11.3	38.	182.	53.	253.	19.	148.
2/24/79	445	17.3	8.0	11.3	40.	182.	56.	253.	20.	148.
2/24/79	500	17.0	8.0	11.3	40.	185.	56.	257.	20.	151.
2/24/79	515	17.0	8.0	11.5	40.	175.	56.	243.	20.	143.
2/24/79	530	17.0	7.8	11.5	40.	180.	55.	246.	20.	144.
2/24/79	545	17.0	9.8	10.0	60.	175.	97.	282.	35.	166.
2/24/79	600	17.3	8.0	11.3	42.	185.	58.	257.	21.	151.
2/24/79	615	17.3	8.0	11.3	42.	185.	58.	257.	21.	151.
2/24/79	630	17.3	7.8	11.3	42.	180.	57.	246.	21.	144.
2/24/79	645	17.3	8.0	11.3	42.	180.	58.	250.	21.	147.
2/24/79	700	17.0	7.8	11.5	48.	180.	66.	246.	23.	144.
2/24/79	715	17.0	7.8	11.5	50.	185.	68.	253.	24.	148.
2/24/79	730	17.0	7.5	11.8	70.	184.	94.	246.	33.	144.
2/24/79	745	17.0	8.8	11.3	80.	190.	118.	281.	42.	165.
2/24/79	800	17.0	9.0	10.5	60.	185.	90.	278.	32.	163.
2/24/79	815	17.0	9.3	10.3	60.	185.	93.	285.	33.	168.
2/24/79	830	17.0	9.0	10.3	55.	185.	83.	278.	30.	163.
2/24/79	845	17.0	8.8	10.5	50.	182.	74.	269.	26.	158.
2/24/79	900	16.1	8.8	10.5	50.	190.	74.	281.	26.	165.
2/24/79	915	16.1	9.8	9.6	50.	185.	81.	298.	29.	175.
2/24/79	930	16.1	9.3	10.0	48.	185.	74.	285.	26.	168.
2/24/75	945	16.1	9.8	9.6	50.	185.	81.	298.	29.	175.
2/24/79	1000	16.7	10.0	9.3	50.	190.	82.	312.	29.	183.
2/24/79	1015	16.7	9.8	9.6	50.	191.	81.	308.	29.	181.
2/24/79	1030	16.7	9.5	9.8	50.	185.	79.	290.	28.	171.
2/24/79	1045	16.7	9.5	9.8	55.	190.	86.	299.	31.	175.
2/24/79	1100	17.0	9.3	10.0	58.	196.	89.	302.	32.	178.
2/24/79	1115	17.0	9.0	10.3	42.	190.	63.	286.	23.	168.
2/24/79	1130	17.0	9.3	10.0	50.	190.	77.	293.	28.	172.
2/24/79	1145	17.0	9.8	9.6	45.	200.	73.	323.	26.	189.
2/24/79	1200	16.1	-1.0	.0	-1.	-1.	-1.	-1.	-1.	-1.

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**                                 15 MIN. DATA                                 **
**                          DRY STACK GAS CONCENTRATION                         **
**                                                                              **
**                          O2    CO2     CO     NO     CO     NO    CO     NO  **
**                LOAD   VOL%   VOL%   PPMV   PPMV   PPMV   PPMV  NG/J   NG/J  **
**     DATE  TIME  MWTH   MEAS   MEAS   MEAS   MEAS   3%O2   3%O2               **
**********************************************************************************
**  2/24/79  1215  16.1    7.6   11.5    40.   200.    54.   269.   19.   158.  **
**  2/24/79  1230  16.1    7.5   11.5    40.   200.    53.   267.   19.   157.  **
**  2/24/79  1245  16.1    7.7   11.3    35.   190.    47.   258.   17.   151.  **
**  2/24/79  1300  16.1    7.8   11.0    35.   185.    48.   253.   17.   148.  **
**  2/24/79  1315  16.1    8.4   10.8    40.   185.    57.   265.   20.   156.  **
**  2/24/79  1330  16.1    8.5   10.8    35.   184.    51.   266.   18.   156.  **
**  2/24/79  1345  16.1    8.6   10.8    34.   190.    49.   277.   18.   162.  **
**  2/24/79  1400  16.1    8.9   10.3    35.   180.    52.   268.   19.   158.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
**  0/ 0/79     0    .0     .0     .0     0.     0.     0.     0.    0.     0.  **
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TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO. EPA-600/7-80-085a	2.	3. RECIPIENT'S ACCESSION NO. PB80 211386
4. TITLE AND SUBTITLE Thirty-day Field Tests of Industrial Boilers: Site 1--Coal-fired Spreader Stoker		5. REPORT DATE April 1980
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) W.A. Carter and H.J. Buening		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS KVB, Inc. P.O. Box 19518 Irvine, California 92714		10. PROGRAM ELEMENT NO. EHE624
		11. CONTRACT/GRANT NO. 68-02-2645, Task 4
12. SPONSORING AGENCY NAME AND ADDRESS EPA, Office of Research and Development Industrial Environmental Research Laboratory Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED Task Final; 3/79-3/80
		14. SPONSORING AGENCY CODE EPA/600/13

15. SUPPLEMENTARY NOTES IERL-RTP project officer is Robert E. Hall, Mail Drop 65, 919/541-2477.

16. ABSTRACT

This is a final report for a test program to evaluate the long-term effectiveness of combustion modifications on industrial boilers. Previous short-term tests had been performed on industrial boilers to determine the effect of combustion modifications on air pollutant emissions such as NOx, SOx, CO, HC, and particulate. The objective of this program was to determine if the combustion modification techniques which were effective for the short-term tests are feasible for longer periods. The report gives results of a 30-day field test of a 29.3 MW output (100,000 lb steam/hr) coal-fired spreader stoker. Low excess air was used to control NOx emissions. Results indicate that low excess air firing is an effective long-term NOx control for spreader stokers. The as-found NOx concentration was 243.9 ng/J (400 ppm at 3% O2, dry) with the boiler load at 80% of design capacity. Firing in the low excess air mode reduced the as-found condition by about 20%. Low excess air firing also increased efficiency by about 3%.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group	
Pollution	Sulfur Oxides	Pollution Control	13B	07B
Boilers	Nitrogen Oxides	Stationary Sources	13A	
Coal	Carbon Monoxide	Industrial Boilers	21D	
Combustion	Hydrocarbons	Combustion Modification	21B	07C
Field Tests	Dust	Spreader Stokers	14B	11G
Stokers		Low Excess Air		
		Particulate		

18. DISTRIBUTION STATEMENT Release to Public	19. SECURITY CLASS *(This Report)* Unclassified	21. NO. OF PAGES 210
	20. SECURITY CLASS *(This page)* Unclassified	22. PRICE

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